FISHERIES MANAGEMENT AND EVALUATION PLAN

Lower Columbia River Chinook in Oregon Freshwater Fisheries of the Lower Columbia River Tributaries Between the Pacific Ocean and Hood River

Prepared by

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SUMMARY

This Fisheries Management and Evaluation Plan (FMEP) specifies the future management of recreational fisheries potentially affecting listed lower Columbia River chinook salmon in the tributaries of the lower Columbia River. Five natural chinook populations are identified for this listed species. Fisheries in Oregon tributaries of the lower Columbia River will be managed to harvest hatchery-origin salmon and steelhead and harvestable surpluses of other species in a manner that does not jeopardize the survival and recovery of listed spring and fall chinook. Only chinook salmon that are adipose finclipped will be allowed to be retained beginning in 2002 in the Willamette, Clackamas, and Sandy basins. All nonfinclipped, wild fish will be required to be released. This selective fishery regime is expected to result in reduction of nearly 90% in average tributary fishery mortalities for Sandy spring chinook and Sandy and Clackamas fall chinook. Tributary fishery impacts on lower Columbia River chinook in other Oregon tributaries of the lower Columbia are not likely to impede the survival and recovery potential for these populations. Ocean and mainstem Columbia fishery impacts are addressed by other ESA processes although impacts of those fisheries are considered in this FMEP through a cumulative impact assessment. A comprehensive monitoring and evaluation plan will assess the catch, the abundance of hatchery and wild fish, and angler compliance. This information will be used annually to assess whether impacts to listed fish are as expected. Review of the FMEP will occur in 2005 (after 3 years of implementation) and at 5-year intervals thereafter to evaluate whether the objectives of the FMEP are being accomplished.

Title: ***Fishery Management and Evaluation Plan - Lower Columbia River Chinook in Oregon Tributary Fisheries of the Lower Columbia River Between the Pacific Ocean and Hood River***

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SECTION 1. FISHERIES MANAGEMENT

1.1) General objectives of the FMEP.

The objective of this Fish Management and Evaluation Plan (FMEP) is to harvest hatchery-origin salmon and steelhead, and harvestable surpluses of other species such as sturgeon in a manner that does not jeopardize the survival and recovery of listed spring and fall chinook in the Lower Columbia River (LCR) Evolutionarily Significant Unit (ESU). This FMEP includes all non-Indian sport fisheries which affect or could potentially affect Oregon populations of LCR spring and fall chinook salmon in the Oregon tributaries of the lower Columbia River. The primary focus is on fisheries that target unlisted hatchery spring chinook, steelhead, and coho, but this plan also considers the potential of other fisheries to affect this threatened ESU. Tributary fishery impacts are considered in light of expected mainstem Columbia River, estuary, and ocean fishery impacts. Fisheries in the Columbia River mainstem and ocean are addressed via section 7 consultations completed in US v. Oregon and Pacific Fishery Management Council forums.

1.1.1) List of the "Performance Indicators" for the management objectives.

Performance indicators include fish population indicators by which we assess the status of populations in the listed ESU to determine trends in abundance, risk thresholds, and the impacts of management actions including fisheries. The primary fish population indicators for listed LCR spring chinook are escapement estimates based on Marmot Dam counts and spawning ground index counts in the upper Sandy River basin. Primary fish population indicators for listed LCR fall chinook are spawning escapement indices based on spawning ground surveys in the Sandy and Clackamas rivers, and in smaller tributaries between the Hood and Sandy rivers, and between Scappoose Creek and Youngs River.

Fishery performance is also monitored to regulate impacts. The primary fishery indicators for LCR tributary chinook sport fisheries are catch record card (CRC)

estimates of total catch by subbasin from voluntary harvest tag returns by anglers. Fishery indicators for mainstem Columbia River commercial fisheries include total poundage landings which are solicited in phone surveys in-season and reported on fish receiving tickets for final landing estimates. Commercial fishery catch composition and average weight information is also obtained by subsampling a portion of the catch at commercial fish buyer sites.

1.1.2) Description of the relationship and consistency of harvest management with artificial propagation programs.

Harvest in the tributary fisheries is largely designed to access surplus returns of fish destined for hatcheries within and upriver of the LCR ESU. There are currently 11 hatcheries in Oregon, and 14 in Washington within the LCR ESU boundaries. These hatcheries release spring chinook, fall chinook, coho salmon, steelhead, and resident trout. Hatcheries are operated by a variety of public and private institutions including U. S. Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW), and Oregon Department of Fish and Wildlife (ODFW).

Hatcheries within the LCR were built or modernized primarily to mitigate for lost or reduced salmon runs caused by dams in the Columbia River mainstem and tributaries including the Sandy, Little Sandy, Bull Run, and Clackamas rivers. The Select Area Fishery programs are intended to partially mitigate for lost mainstem fishing opportunity as a result of ESA listing of upriver salmon populations. A hatchery program in Hood River is an attempt to restore and supplement this spring chinook population as mitigation for the Federal Columbia River hydroelectric system.

Hatchery releases in the Oregon portion of the LCR ESU include about 360,000 Sandy River stock spring chinook smolts into the Sandy River, 125,000 Deschutes stock spring chinook smolts into the Hood River, and 900,000 Willamette stock spring chinook smolts into Youngs Bay, Tongue Point/South Channel, and Knappa/Blind Slough select fishery areas. The Sandy spring chinook hatchery program is funded by Portland General Electric (PGE), the City of Portland, the State of Oregon, and the National Marine Fisheries Service (NMFS). The Hood River and Select Areas spring chinook hatchery programs are funded primarily by Bonneville Power Administration (BPA) through the Northwest Power Planning Council (NWPPC) administered fish and wildlife program.

Fall chinook smolts are released from Bonneville Hatchery on Tanner Creek (Upriver Bright stock [URB]), Big Creek Hatchery (Lower River Hatchery tule stock [LRH]), and Klaskanine Hatchery (Select Area Bright stock [SAB]). Bonneville and Big Creek hatcheries are funded by NMFS through the Mitchell Act. Klaskanine Hatchery is funded by BPA through the NWPPC.

Hatchery practices have been widely revamped in recent years to address heightened concerns for wild fish populations. Outdated practices included transfer of stocks among hatcheries to meet production goals and outplanting of hatchery fish in or near wild fish production areas. Only a subsample of releases

were marked, typically with coded-wire tag (CWT) to provide information on survival rates, hatchery practices, and fishery contribution.

Hatchery releases are now localized to sites where straying into natural production areas is minimized and fishery opportunities are optimized. For instance, no hatchery spring chinook have been outplanted into the upper Sandy since 1991. Fall chinook releases were eliminated in the Sandy after 1977 and in the Clackamas after 1981. Similarly, releases of catchable trout have also been eliminated in running waters where fisheries might incidentally catch salmonid smolts.

Local broodstocks are also being developed to reduce risks to wild fish populations. For instance, the Sandy River Subbasin Fish Management Plan (ODFW 1997), which was recently revised (ODFW 2001), implemented in 2002, a program using locally adapted wild broodstock for release into the Sandy River eliminating the use of Upper Willamette River stock spring chinook from the Clackamas Hatchery.

In addition, large-scale marking programs have been implemented so that fisheries can identify and keep hatchery fish while releasing wild fish. Selective fisheries for hatchery fish in tributaries will reduce the numbers of hatchery spring chinook available to potentially stray into natural production areas. Marking will also allow removal of hatchery fish which stray into wild production areas. An expanded marking program was phased in for spring chinook released from the Sandy, Clackamas, and upper Willamette basin hatcheries beginning with the 1997 brood. Beginning in 2002, all hatchery-reared spring chinook returning as adults will be distinguished from wild fish by an adipose finclip. Selective spring chinook fisheries for adipose fin-clipped hatchery fish transitioned to 100% selectivity in 2002 when all returning hatchery spring chinook will be adipose finclipped (except 6-year olds).

Finally, some fisheries have been refocused to areas where hatchery fish can be selectively harvested. For instance, the Select Area Fisheries Project is designed to allow high harvest rates on known stock hatchery fish in areas that are not utilized by listed or naturally producing stocks. Many chinook populations in the LCR, particularly tule populations, are limited by the absence of suitable habitat. Given the circumstances, it is appropriate that harvest be managed to insure that hatchery escapement goals are met, thus protecting what remains of the genetic legacy of the ESU until such time that future planning efforts can lay out a more comprehensive solution leading to recovery.

1.1.3) General description of the relationship between the FMEP objectives and Federal tribal trust obligations.

This FMEP describes all tributary fishery impacts on the LCR chinook ESU so that fishing effects can be accurately assessed but this FMEP explicitly considers only non-Indian fisheries on portions of the LCR chinook ESU which are not subject to Federal court decisions concerning Indian and non-Indian harvest sharing. These fish include lower Columbia River chinook populations

downstream from Bonneville Dam. All tributary fisheries downstream from Bonneville Dam and some mainstem fisheries fall in this category.

Mainstem Columbia River fisheries which affect salmon and steelhead destined for areas upriver from Bonneville Dam are addressed by harvest sharing plans with treaty Indian tribes (*US v. Oregon*). These mainstem fisheries are addressed under the ESA via section 7 consultation with the states and tribes. Affected fish include several LCR chinook ESU populations, upriver spring chinook, and upriver fall chinook. Mainstem fisheries which affect these species are subject to Federal tribal trust obligations and impacts are jointly managed by the four Columbia River treaty Indian tribes, the federal government, and the states of Oregon, Washington, and Idaho under continuing court jurisdiction in *U. S. v. Oregon*. That process is addressed in a separate consultation described in more detail in following sections. Tribal fisheries are not covered in this FMEP, but historical and projected impacts associated with tribal fisheries that affect LCR chinook populations destined for areas upstream from Bonneville Dam are included within impacts addressed by this FMEP. Impacts on upriver spring and fall chinook by Columbia River mainstem sport and commercial fisheries are addressed under a Section 7 consultation process (e.g., NMFS 2000a).

1.2) Fishery management area(s).

1.2.1) Description of the geographic boundaries of the management area of this FMEP.

This management plan describes all freshwater fisheries that affect or could potentially affect LCR chinook salmon in the tributaries of the Columbia River downstream from the Hood River (Figure 1). Included are all freshwater tributary fisheries managed under the sole jurisdiction of the state of Oregon occurring within the boundaries of the LCR chinook ESU including all tributaries to the Columbia River from the mouth upstream to the Hood River, except for the Willamette River upstream from Willamette Falls and spring chinook in the Clackamas River (these fisheries are addressed in the Upper Willamette spring chinook FMEP).

Ocean fishery and mainstem Columbia River impacts are addressed by a Section 7 process although impacts of those fisheries on LCR chinook are considered in the cumulative impact assessment for LCR tributary fisheries (e.g., NMFS 2000b). Ocean fisheries which affect listed LCR chinook include Southeast Alaska and Canadian troll fisheries, which are regulated by Pacific Salmon Commission processes. Significant numbers of listed LCR fall chinook are also taken in Oregon and Washington coastal sport and commercial fisheries regulated by Pacific Fishery Management Council processes.

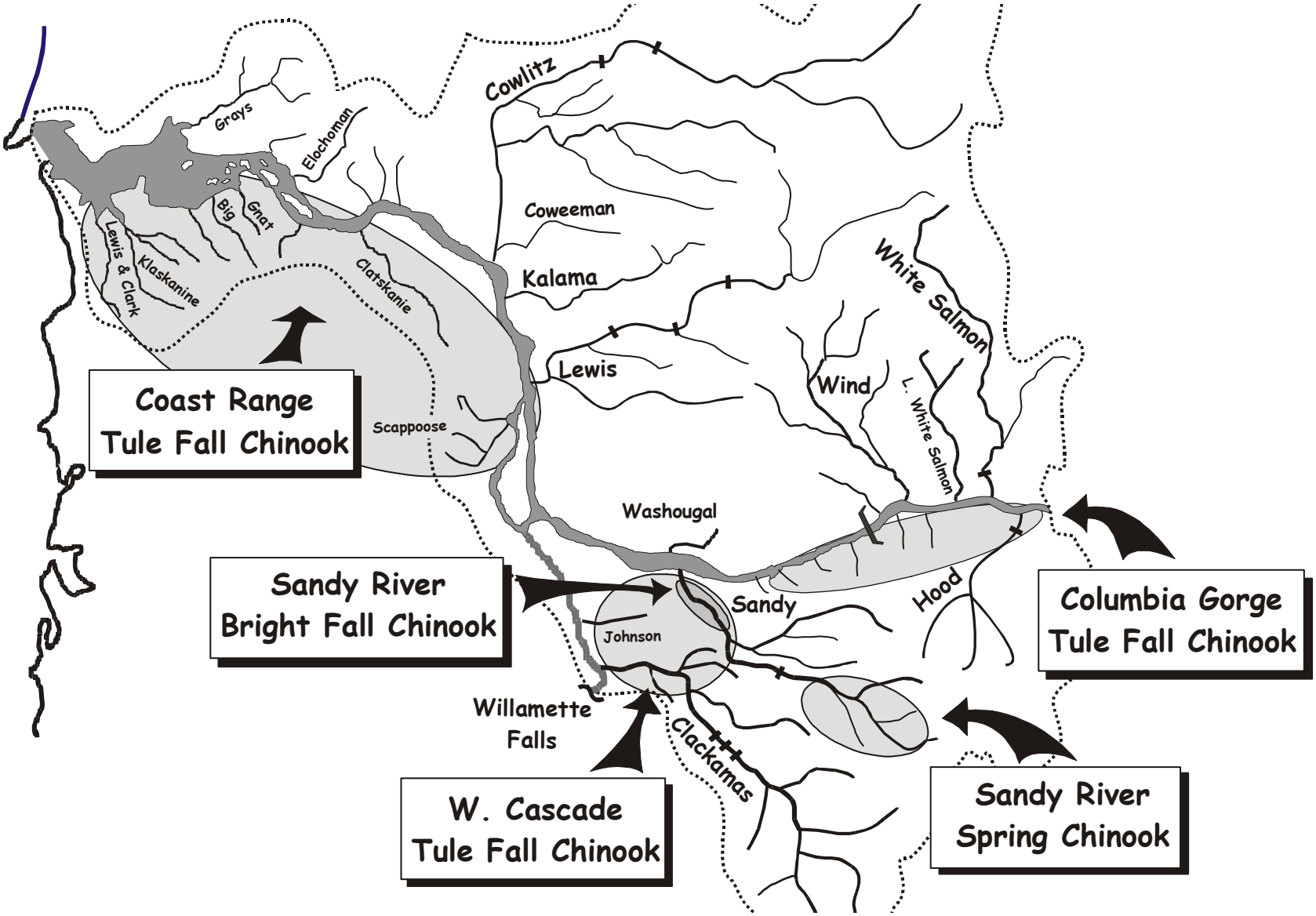

Figure 1. Oregon stocks in the listed lower Columbia River chinook ESU .

1.2.2) Description of the time periods in which fisheries occur within the management area.

Fisheries occur within the management area throughout the period of freshwater residence by adult and juvenile LCR chinook. Adult LCR spring chinook return to freshwater about the same time as UWR spring chinook, with returns beginning around February, increasing to peak numbers in April, and tapering off by June. Fish begin entering the Sandy Basin in significant numbers in March. Migration of adults over Marmot Dam peaks in June and is mostly complete by the end of July, although there is a small but consistent component that passes in August and September (Figure 2).

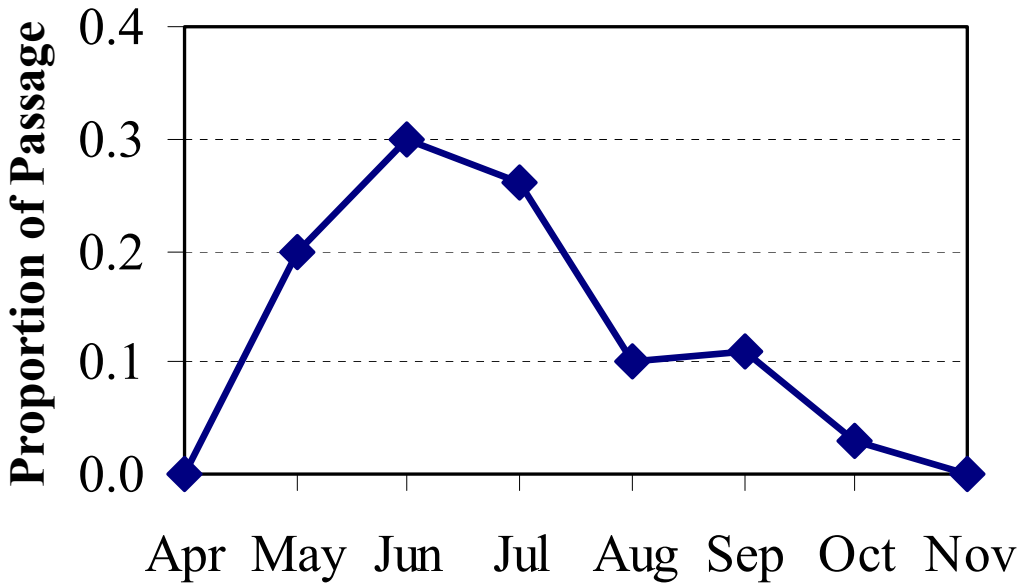

Figure 2. Sandy River adult spring chinook run timing over Marmot Dam.

Adult tule fall chinook enter freshwater beginning in August and continue through September. They pass quickly into tributaries and spawn in the lower reaches in late September through mid-October. Adult LRW fall chinook (bright fall chinook) enter freshwater later, beginning in September and continue through early November. Some minor passage of LRW fall chinook has been observed at Marmot Dam, but most of the Sandy River population spawns in lower reaches from mid-October through at least the end of November.

Lower Columbia River spring chinook have a life history pattern that includes traits from both ocean- and stream-type life histories, although ocean-type predominates (Myers et al. 1998). Smolt emigrations occur in fall as young of the year and in spring as age-1 fish. Many of the fall migrants may continue to rear in downstream areas until the following spring before migrating to the ocean. Lower Columbia River fall chinook have primarily ocean-type life histories, with smolt migrations occurring from late spring through early fall, and peaking in June or July.

Fisheries and time periods are listed in Table 1 and described in more detail below. Sport fishery descriptions and dates are as prescribed in current sport fishing regulations detailed in the 2001 Oregon Sport Fishing Regulations pamphlet.

Fisheries targeting adult chinook occur primarily around the peak of the freshwater migration, from March through July for spring chinook and August through November for fall chinook. Fisheries targeting other species occur year-round. No fisheries target juvenile spring or fall chinook. Lower Columbia River mainstem sport and commercial fisheries for salmon during winter and early spring affect primarily Willamette and LCR spring chinook stocks but also take some upriver spring chinook. Mainstem non-Indian fisheries are normally closed upstream from Bonneville Dam in winter or spring. Historically, mainstem Columbia River fisheries in April and May targeted on both lower river spring chinook and upriver spring chinook. Lower Columbia River mainstem sport and commercial fisheries for salmon during late summer and fall affect a variety of chinook stocks including Upper, Middle, and Lower Columbia River and Snake River fall chinook.

Table 1. Significant tributary fisheries occurring within the lower Columbia River chinook management area of the FMEP. Fisheries occurring in the mainstem Columbia River are addressed under US v. Oregon consultations.

Fishery	Area	Typical open dates	Peak period	Effect[1]
		Sport		
Spring chinook	Lower Willamette R.	Year-round [3]	Mar – May	A[2]
	Lower Clackamas R.	Year-round [3]	May – Jul	A[2]
	Lower Sandy R.	Feb 1 –Oct 31 [3]	Apr – Jul	A
	Lower Hood R.	Currently closed [3]	Apr – Jun	A[2]
Fall chinook	Clatskanie R., Klaskanine R., Lewis and Clark R., Youngs R., & Eagle Ck. (Clackamas)	Late May – Dec 31	Aug – Sep	A
	Big, Bear, Upper Gnat Ck's.	Late May – Aug 31, Oct 1 – Dec 31	Aug, Oct	A
	Lower Willamette R.	Year-round [3]	Aug – Oct	A
	Lower Clackamas R.	Year-round [3]	Set – Oct	A
	Lower Sandy R.	Feb 1 – Oct 31 [3]	Sep – Oct	A
	Lower Hood R.	Aug 1 – Dec 31 [3]	Aug – Sep	A
Coho	Klaskanine R., Lewis and Clark R., Youngs R., & Eagle Ck.	Aug 1 – Oct 31	Sep – Oct	B
	Big, Bear, Upper Gnat Ck's.	Late May – Aug 31, Oct 1 – 31	Oct	B
	Lower Willamette R.	Year-round [3]	Sep – Oct	B
	Lower Clackamas, Sandy R's.	Sep 1 – Oct 31 [3]	Set – Oct	B
	Eagle Ck. (Clackamas)	Sep 1 – Nov 30 [3]	Sep – Oct	B
	Lower Hood R.	Year-round	Sep – Oct	B

(continued)

Table 1. Significant fisheries occurring within the lower Columbia River chinook management area (continued).

Fishery	Area	Typical open dates	Peak period	Effect[1]
Winter steelhead	Clatskanie, Klaskanine, Lewis and Clark, Youngs R's.	Late May – Mar 31	Dec – Mar	D
	Big, Gnat Ck's.	Oct 1 – Mar 31	Dec – Mar	D
	Lower Willamette R.	Year-round [3]	Dec – Mar	D
	Lower Clackamas R.	Year-round [3]	Dec – Mar	D
	Lower Sandy R.	Year-round	Dec – Mar	B
	Lower Hood R.	Year-round	Dec – Mar	D
Summer steelhead	Lower Willamette R.	Year-round [3]	Apr – Jul	B
	Lower Clackamas R.	Year-round [3]	Apr – Jul	B
	Lower Sandy R.	Year-round	Apr – Jul	B
	Eagle Ck. (Columbia)	Late May – Aug 31	Aug – Sep	B
	Herman Ck.	Late May – Oct 31	Aug – Sep	B
	Lower Hood R.	Year-round	Apr – Nov	B
Shad	Lower Willamette R.	Year-round	May – Jul	B
Sturgeon	Lower Willamette R.	Year-round	Mar – Jun	D
Trout	Lower Willamette R.	Late May – Oct 31	None	C
	Upper Clackamas R.	Late May – Oct 31	May – Aug	D
	Upper Hood R.	Late May – Oct 31	May – Aug	C[2]
	Standing waters	Year-round	Year-round	D[2]
Warmwater species	Willamette mainstem	Year-round	Jun – Aug	C
	Standing waters	Year-round	May – Sep	D[2]

[1] *A = chinook target fishery, B = potential for incidental encounter of LCR chinook adults, C = limited potential for incidental encounter of LCR chinook juveniles, D = LCR chinook not encountered.*

[2] *Wild LCR chinook not present in system.*

3 Regulations sometimes modified based on year-specific expectations and goals.

Sport chinook fishery – Willamette Basin: A fishery for chinook salmon occurs in Multnomah Channel and the lower Willamette River upstream to Willamette Falls, and the lower Clackamas River from the mouth to River Mill Dam. The fishery in the Willamette mainstem below the Falls and the lower Clackamas River may intercept wild LCR fall chinook. The chinook fishery is open year-round or reopens under permanent regulations on January 1 in most areas. Fisheries in tributaries near spawning areas typically close in August to protect spawners. By 2002, all Willamette Basin spring chinook fisheries are planned to be restricted to retention of adipose fin-clipped spring chinook only.

Sport spring chinook fishery – Sandy Basin: A fishery for spring chinook salmon occurs in the lower Sandy River from the mouth to Marmot Dam. The fishery may intercept wild LCR fall and spring chinook. The chinook fishery is open from February 1 through October 31, and closed the rest of the year to protect LRW fall chinook. In addition, all fishing is prohibited September 16 through November 15 near the primary fall chinook spawning area near Oxbow Park. Spring chinook spawn almost entirely upstream from Marmot Dam where salmon fishing is prohibited. The spring chinook fishery downstream from Marmot Dam generally occurs from March through August and peaks in April and May, although spring chinook are occasionally caught as early as February and as late as October. Beginning in 2002, the Sandy Basin spring chinook fishery and the

fall chinook fisheriy were restricted to retention of adipose fin-clipped chinook only.

Sport fall salmon tributary fisheries: There are no longer any significant tributary fisheries for fall chinook in the LCR chinook ESU. Most of the fisheries affecting fall chinook have been reformed recently to further reduce harvest impacts. Significant fisheries for adipose fin-clipped hatchery coho salmon occur in the lower Willamette River, lower Clackamas River, lower Sandy River, Eagle Creek (Clackamas), and Eagle Creek (Columbia) from September to November of some years. Minor fisheries for adipose fin-clipped hatchery coho salmon occur in the Klaskanine River and Big and Gnat creeks. Coho fisheries encounter adult fall chinook, but occur too late in the year to encounter many spring chinook. Most tule type fall chinook are on spawning beds, away from prime coho fishing areas, when coho fisheries are peaking. The fish condition and flesh quality of chinook are also low when the fish are available. Clackamas River fall chinook were protected by the regulation that only adipose fin-clipped chinook may be retained during the entire year in the Clackamas and Willamette in 2002. Spawning Sandy River chinook are protected by an area closure from September 16 to November 15 that encompasses most of the chinook spawning area. Sandy River fall chinook were protected by the regulation that only adipose fin-clipped chinook may be retained in 2002 and by the November 1 season closure. Juvenile spring chinook are rare in the lower Sandy River during this time, and juvenile fall chinook are absent. Neither are vulnerable to the fishing gear used for adult coho. Big, Bear, and Gnat creeks are closed from September 1 to 30.

Sport winter steelhead fisheries: Fisheries for winter steelhead occur from November through May and are restricted to adipose fin-clipped hatchery steelhead. Fisheries occur primarily in the lower reaches and tributaries of the Hood, Sandy, and Clackamas rivers, although minor fisheries targeting winter steelhead also occur in lower Columbia Coast Range tributaries such as Big and Gnat creeks, and the Klaskanine River, and the mainstem Columbia River. Fisheries are concentrated from December through March when fall chinook are not abundant. However, small numbers of late running fall chinook and early returning spring chinook are handled incidentally in winter steelhead fisheries in the Sandy River throughout the winter months. Chinook cannot be retained between November 1 and January 31 in the lower Sandy.

Sport summer steelhead fisheries: Significant fisheries for adipose fin-clipped hatchery summer steelhead occur in the lower Willamette mainstem, lower Clackamas, lower Sandy, and lower Hood rivers, and in the mouth of Herman Creek. Summer steelhead are also occasionally caught in the mouths of other small tributaries such as Big and Eagle (Columbia) creeks. Summer steelhead enter fisheries from March through October and most of the catch occurs from April through August. Both spring and fall chinook adults may be encountered by summer steelhead anglers as chinook are often present at the same time as summer steelhead. The Columbia River from the mouth to the I-5 Bridge does not open to angling for hatchery steelhead until May 16, which is after the majority of Sandy River spring chinook has passed upstream.

Sport shad fisheries: Significant shad fisheries occur in the lower Willamette River from May through July. The Willamette fishery occurs prior to the arrival of adult fall chinook, and does not impact fish destined for the Clackamas River. The onset of the shad run coincides with the tail end of the Sandy River spring chinook run near the mouth of the Sandy River and small numbers of adult spring chinook are hooked in the shad fishery. These impacts are considered with mainstem spring chinook fishery impacts. Shad fishing gear is much lighter than salmon gear which reduces the landing rate but some adult spring chinook are landed. The recreational shad fishery in the Columbia River is normally closed from April 1 to May 15 downstream from Bonneville Dam to reduce impacts to listed spring chinook.

Sport sturgeon fisheries: Significant sturgeon fisheries occur in the lower Willamette River. The fishery is generally open year-round and legal sturgeon retention sizes are 42 to 60 inches. Sturgeon anglers fish with bait on the bottom and use very large barbless hooks to catch these large fish. In the lower Willamette River, effort is concentrated from March through June.. Most sturgeon fishing in the Willamette River is from boats near Willamette Falls and near the mouth, although a significant bank fishery occurs at Oregon City. Sturgeon fisheries in the Willamette are sampled with a statistical creel survey. Angler trips average about 6,000 per year in the lower Willamette River. Chinook impacts in sturgeon fisheries are zero.

Sport trout fisheries: Fisheries for trout occur in tributaries and standing waters throughout the LCR and lower Willamette Basin. Within the LCR ESU, plants of hatchery-reared trout for put-and-take fisheries are restricted to standing waters and streams without anadromous fish to avoid impacts on steelhead and salmon smolts. Many of these plants and fisheries now occur above or in the same reservoirs where dams block historic salmon migrations.

Trout fisheries occurring in waters containing LCR spring and fall chinook are restricted to catch and release with artificial flies and lures only. Impacts on adult chinook are negligible. Age-0 chinook parr and smolts are too small to be vulnerable to trout fisheries. Age-1 spring chinook smolts are protected by a series of closed season, size, and gear restrictions to minimize impacts. Trout season opening dates in running waters where salmon and steelhead are present are delayed until late May, after most spring migrant chinook smolts have passed.

Creel survey data confirms that catch of spring chinook is very low in trout fisheries. For instance, a 1988 statistical creel survey program in the upper Clackamas basin from the season opener on April 23 until May 27, estimated that only 100 spring chinook smolts were caught in 37,500 angler trips for a total of 104,000 hours. Catch of hatchery trout totaled 21,000. To further minimize impacts, the trout season opener has since been delayed until late May.

Sport warmwater fisheries: Significant fisheries occur in the Willamette River, Multnomah Channel, and lower sections of some large tributaries for warmwater game species including largemouth bass, smallmouth bass, channel catfish, crappie, bluegill, and walleye. Warmwater fisheries also occur in standing waters

throughout the basin. Chinook impacts in warmwater fisheries are nil. In the Willamette River and its tributaries, warmwater fisheries are concentrated in backwaters and sloughs which are not hospitable rearing areas for juvenile salmonids. Chinook are not present in standing waters where warmwater fisheries occur. Fisheries are also most active during warm summer months after spring migrant juvenile chinook have left the system and before fall migrant juvenile chinook disperse downstream from rearing areas. Since warmwater species potentially prey on and compete with juvenile chinook, warmwater fisheries could actually provide some marginal benefit for listed salmon if the warmwater catch were significant.

Sport smelt fisheries: Smelt occasionally appear in Oregon tributaries, primarily the Sandy River. Smelt runs normally occur in winter or early spring, and are short lived. Sport smelt fisheries are open in the lower reaches of most LCR tributaries, and in the entire Sandy and Clackamas basins. Juvenile chinook may be present in the river at the time, but are rarely caught in smelt dip nets. Impacts on chinook salmon are nil.

1.3) Listed salmon and steelhead affected within the Fishery Management Area specified in section 1.2.

This plan considers tributary fishery impacts solely on Oregon populations of lower Columbia River spring and fall chinook which were listed as threatened effective May 24, 1999. Other listed salmon and steelhead present in the LCR chinook ESU management area include upper Willamette River spring chinook (threatened effective May 24, 1999), lower Columbia River steelhead (threatened effective May 18, 1998), Columbia River chum (threatened effective May 24, 1999), Snake River spring/summer chinook (threatened effective May 22, 1992), Snake River fall chinook (threatened effective May 22, 1992), Snake River sockeye (endangered effective December 20, 1991), Snake River steelhead (threatened effective May 18, 1998), upper Columbia River steelhead (endangered effective May 18, 1998), upper Columbia spring chinook (endangered effective May 24, 1999), and mid-Columbia River steelhead (threatened effective May 24, 1999). Fishery impacts on other listed stocks are addressed by other plans or consultation processes. For instance, fishery impacts on listed upper Willamette River chinook, upper Willamette River steelhead, lower Columbia River steelhead, and Columbia River chum are considered in separate Fish Management and Evaluation Plans prepared by the Oregon Department of Fish and Wildlife.

The lower Columbia River chinook ESU includes all naturally-spawned populations residing below impassible natural barriers from the mouth of the Columbia River to the crest of the Cascade Range just east of Hood River in Oregon and the White Salmon River in Washington. This ESU excludes populations above Willamette Falls. The ESU includes naturally-spawned chinook populations founded by hatchery populations which originated within the ESU even if they may not be representative of the historic local stock or if they include a mixture of within-ESU stocks. Within this ESU, there are historic runs of three different chinook salmon stocks: spring-run, late fall "brights", and early fall "tules". Listed Oregon populations include naturally-spawned stocks of spring chinook in the Sandy River, bright fall chinook (LRW) in the Sandy River, and tule fall

chinook in the Hood, Sandy, and Clackamas rivers, as well as numerous smaller tributaries to the Columbia River between the mouth and Scappoose Creek.

Spring-run chinook: The Sandy River contains the only spring chinook population in this ESU that continues to support substantial natural production (Meyers et al. 1998) and Oregon's only spring chinook population in this listed ESU. Five basins historically produced lower Columbia River spring chinook, two within Oregon, the Sandy and Hood rivers, and four within Washington; the Cowlitz, Kalama, Lewis, and White Salmon rivers. The natural Hood River spring chinook population was extirpated in the 1960's after a flood caused by the natural breaching of a glacial dam resulted in extensive habitat damage in West Fork production areas. Natural production in the Hood River basin was probably low historically due to habitat limitations, but agriculture, forestry, and fishing practices further depressed the population before extirpation. Natural production areas in the Cowlitz, Lewis and White Salmon rivers were blocked by dam construction, and natural production in the Kalama River was probably low historically. By 1950, only a remnant population existed in the Kalama River due to habitat degradation and fishing impacts.

Natural spring chinook production in the Sandy River declined to very low levels prior to 1970 but has rebounded following a hatchery smolt release program in the upper basin using Willamette stock spring chinook from Clackamas Hatchery. Spawning areas are currently located almost entirely upstream from Marmot Dam (RM 30). Primary production areas include the Salmon River and Still Creek, although the Zigzag and mainstem Sandy rivers also support significant spawning activity. Hydro projects in the Sandy Basin have restricted access to almost all of the historically-important spawning and rearing areas for spring chinook. Marmot Dam and the Little Sandy Diversion Dam were constructed on the Sandy and Little Sandy rivers in 1913, and Headworks Dam was constructed on the Bull Run River in 1922. Fish passage was provided at Marmot Dam, however due to water diversion, flows were too low in many years to allow passage above the project. The diversion canal was not screened until 1952, and prior to that fish managers felt it was not justifiable to allow adult salmon to spawn above the dam only to have a large portion of outmigrating juveniles diverted from the mainstem and into Roslyn Lake. Therefore, most adult salmon were trapped at Marmot and used for artificial propagation. Counts of spring chinook at Marmot Dam dwindled to near zero in the 1950's and 1960's, however, small numbers of fish did pass, and some spawning likely took place below the dam. No passage was provided at Headworks Dam on the Bull Run River, effectively eliminating fish production from that basin.

Naturally spawned populations of spring-run chinook in the Hood or Clackamas rivers are not included in the LCR ESU. The current spring chinook population in the Hood River basin was reintroduced from Deschutes River hatchery stock which are included in the unlisted mid-Columbia chinook ESU (Meyers et al. 1998, NMFS 2000c). Spring chinook in the Clackamas are included in the listed upper Willamette River chinook ESU.

Late fall "bright" chinook: There are currently three populations of bright LRW fall chinook in this ESU but only one in Oregon. All LRW populations are naturally-produced and self-sustaining, with no significant impacts from hatchery programs. Most production occurs in Washington's North Fork Lewis and East Fork Lewis rivers. The Oregon population spawns in the Sandy River, primarily in the lower

mainstem reach between Dabney and Oxbow parks (RM 6-13) (Figure 1), although some spawning also occurs in tributaries and in upstream areas, including above Marmot Dam (RM 30). Historic production areas in the Sandy basin also included the Bull Run River. The relative contribution of Bull Run production is unknown, but may have been similar in magnitude to that of the Sandy River. The Sandy River LRW stock is genetically distinct from the earlier-spawning tule chinook stock which also spawns in the Sandy River (Marshall et al. 1995).

Early fall "tule" chinook: All medium to large tributaries in the LCR once had native populations of fall chinook salmon. Wild tule fall chinook historically spawned in most Oregon side tributaries of the LCR ESU but remaining populations are small and either originated or are sustained by hatchery fish. Tule fall chinook salmon are still present in almost all Washington subbasins in the lower Columbia River. Tule fall chinook are produced from Elochoman, Cowlitz, Toutle, Kalama, and Washougal hatcheries in Washington and Big Creek Hatchery in Oregon. The NMFS designated hatchery tule stocks as an unlisted component of the ESU not essential for recovery. Tule fall chinook hatchery programs have been substantially reduced due to Mitchell Act funding reductions in the mid-1990s.

We grouped Oregon populations of tule fall chinook into management units based on bio-geographical factors and life history differences among stocks within the ESU. The *Western Cascade fall chinook management unit* includes tributaries upstream of Scappoose Creek, including the Clackamas River and lower Willamette River tributaries, to the Sandy River. The Sandy and Clackamas rivers originate in the Cascade Range and have flows derived chiefly from snow melt and groundwater. There are self-sustaining populations of tule stock fall chinook in the lower Sandy and Clackamas rivers which are thought to have originated from former hatchery programs in these basins. The Sandy River tule stock has a earlier run timing and a younger age class composition than the bright stock which also occurs in the Sandy River. The native fall chinook run in the lower Clackamas River was probably eliminated in the 1930's and 1940's by mainstem Willamette pollution problems. The Clackamas River hydropower complex, with initial construction in 1904, affected passage, flow, temperature, and the productivity of fall chinook populations in the remaining natural spawning areas below North Fork Dam.

The *Coast Range fall chinook management unit* includes tributaries from Youngs Bay upstream to and including Scappoose Creek. These drainages are relatively short, low gradient, and have similar geologic properties. Flows are derived chiefly from rainwater and ground water. Currently all naturally spawning chinook in these tributaries are tule stock, originating primarily from first generation stray hatchery production. It is unclear if a self-sustaining natural run of fall chinook remains within the population complex, or if spawners consist solely of stray hatchery fish. There were 14 populations provisionally listed in ODFW (1995) that would make up this population complex. However, most of those populations were probably historically small or ephemeral due to the combination of early run timing of the native tule stock and the typically dry early fall months which restrict flows during that time. Most of these streams are better suited to support later spawning coho and chum. Habitat quality has been degraded by urban development, agriculture, logging, and road building activities. Access to some areas has been restricted by culverts, diversions, and hatchery weirs.

The *Columbia River Gorge fall chinook management unit* includes tributaries upstream of the Sandy River to Hood River. Tule stock fall chinook spawn naturally in the lower Hood River, and most (~80%) are thought to be naturally produced based on scale samples taken from fish at Powerdale Dam. Powerdale Dam was constructed in 1929 and has affected passage, flow, and productivity of fall chinook populations in the remaining natural spawning areas below the dam. Bonneville Dam on the Columbia River has also reduced survival of adult and juvenile chinook from the Hood River, effectively reducing the population productivity.

The Hood River is the only Oregon basin with enough accessible habitat to support a self-sustaining population of chinook within this management unit. Other basins would experience short-term extinctions during unfavorable conditions. Most other tributaries in this management unit are very short, with less than a mile to barrier falls. The exception is Herman Creek which has 5.6 miles accessible to anadromous fish. Tule fall chinook are occasionally observed spawning in some of these smaller streams but these fish are thought to be primarily strays from hatchery programs or Sandy/Hood populations.

1.3.1) Description of "critical" and "viable" thresholds for each population (or management unit) consistent with the concepts in the document "Viable Salmonid Populations and the Recovery of Evolutionarily Significant Units."

NMFS defines population performance in terms of abundance, productivity, spatial structure, and diversity and provides guidelines for each (McElhany et al. 2000). Abundance guidelines include critical and viable population thresholds. Critical thresholds are those below which populations are at relatively high risk of extinction. Critical population size guidelines are reached if a population is low enough to be subject to risks from: 1) depensatory processes, 2) genetic effects of inbreeding depression or fixation of deleterious mutations, 3) demographic stochasticity, or 4) uncertainty in status evaluations. If a population meets one critical threshold, it would be considered to be at a critically low level. Viability thresholds are those above which populations have negligible risk of extinction due to local factors. Viable population size guidelines are reached when a population is large enough to: 1) survive normal environmental variation, 2) allow compensatory processes to provide resilience to perturbation, 3) maintain genetic diversity, 4) provide important ecological functions, and 5) not risk effects of uncertainty in status evaluations. A population must meet all viability population guidelines to be considered viable.

Productivity or population growth rate guidelines are reached when a population's productivity is such that: 1) abundance can be maintained above the viable level, 2) viability is independent of hatchery subsidy, 3) viability is maintained even during poor ocean conditions, 4) declines in abundance are not sustained, 5) life history traits are not in flux, and 6) conclusions are independent of uncertainty in parameter estimates. Spatial structure guidelines are reached when: 1) number of habitat patches is stable or increasing, 2) stray rates are stable, 3) marginally suitable habitat patches are preserved, 4) refuge source populations are preserved, and 5) uncertainty is taken into account. Diversity guidelines are reached when: 1) variation in life history, morphological, and genetic traits is maintained,

2) natural dispersal processes are maintained, 3) ecological variation is maintained, and 4) effects of uncertainty are considered.

This fishery management plan focuses primarily on abundance and productivity, which are the two key performance features most directly affected by fishery impacts of the scale we propose. Several listed LCR chinook stocks would not meet spatial structure and diversity guidelines for population viability defined by the NMFS either because of a limited number of wild populations or because of the effects of natural spawning by hatchery fish. However, spatial structure and diversity guidelines will not be achieved by further reductions in fisheries which affect these chinook stocks. Spatial structure guidelines must be addressed by habitat restoration measures. Diversity guidelines must be addressed by hatchery measures. Spatial structure and diversity of wild salmon populations can be affected by high fishing rates but the effects of fishing rates identified in this plan are expected to be insignificant as long as abundance and productivity guidelines are met. The fishery impact rates proposed also will not reduce population sizes to levels where spatial effects are exacerbated. The proposed fishery impact rates on wild fish are not expected to exert sufficient selection pressure on any single characteristic to affect diversity. See section 2.1.2 for a more detailed discussion of why the harvest regime is not likely to result in changes to biological characteristics of the affected ESU's.

We generally defined critical abundance thresholds of at least 300 spawners per year per population or management unit based on review of the conservation biology literature and discussions in McElhany et al. (2000). The NMFS provides limited guidance on fish numbers corresponding to critical and viability abundance thresholds. They discuss hypothetical risks related to genetic processes effective at annual spawning population ranging from 50 to several thousand individuals. They also suggest that spawner numbers of 200-250 to 1,100-1,375 per year might be considered "safe" for chinook (McElhany et al. 2000). Spawner numbers of 300 or greater appear sufficient to avoid detrimental short-term genetic effects. A critical threshold of 300 spawners per year is also consistent with minimum guidelines defined by State Wild Fish Management and Wild Fish Gene Resource Conservation Policies (OAR 635-07-52 and OAR 635-07-538), and ODFW management plans including the Sandy River Subbasin Fish Management Plan (ODFW 1997) (OAR 635-500-3400 to 635-500-3480).

Critical productivity levels were defined based on cohort replacement rate and abrupt declines in run size of the naturally-spawning population. We defined critical replacement as the 3-year average spawners per spawner rate which was projected to result in less than the critical threshold number of spawners within 3 years. Periodic poor cohorts are inevitable but an extended sequence of poor survival should trigger consideration of more conservative management strategies if corresponding declines in abundance are projected to approach levels of concern. Low replacement rates at very large escapements should not trigger a conservative management response because overseeding of habitat produces poor cohort survival. However, more conservative fishery management during poor ocean productivity cycles might help avoid critical low population sizes. The critical productivity threshold which flags abrupt declines in escapement

identifies survival conditions that might warrant preemptive management actions in anticipation of a continuing downward trend. We defined abrupt as greater than a 50% decline in one year relative to the recent year average.

Viability thresholds for abundance were based on one of three alternatives, selected depending on the availability of information for a given population. The preferred standard is average spawner numbers of at least 50% of the subbasin capacity where capacity is estimated based on spawner abundance at the maximum sustained yield point of the stock-recruitment curve. Compensatory processes would provide resilience at this average escapement number. However, data is inadequate to estimate stock-recruitment relationships or habitat capacity for most LCR chinook populations. In cases where data is adequate to determine a normal range in escapement of naturally-produced fish, we defined interim viability goals based on large escapements which we expect will allow capacity to be estimated when monitoring programs provide sufficient samples. In cases where interpretation of escapement data has been confounded by the effects of hatchery fish, we followed a recommendation by NMFS (1999) to use escapement levels associated with maximum sustainable yield (MSY) exploitation rates as an alternative to more comprehensive population modeling in cases when data were inadequate. In all cases, population viability standards were defined for productivity based on a long-term average replacement rate of at least 1.0 (i.e. a stable or increasing population size).

Table 2. List of the natural fish populations, "Viable Salmonid Population" thresholds, and associated hatchery stocks for natural populations of lower Columbia River chinook. Note: these are interim designations and may change in the future as more information and analyses become available.

Population	Critical Thresholds	Viable Thresholds	Hatchery Stock	
			Associated	Essential for recovery?
Sandy River Spring Chinook	*Abundance*: Escapement of 300 natural origin adults/year upstream from Marmot Dam. *Productivity*: Short term avg. replacement rate (3-year avg. spawners per spawner) projected to result in less than critical threshold number of spawners within 3 years (or) Abrupt declines in escapement (>50% in one year) relative to recent year average)	*Abundance*: 3-year average escapement of 2,000 natural origin fish upstream from Marmot Dam (or) Average spawner numbers of at least 50% of basin capacity based on MSY escapement level *Productivity:* generally stable or increasing trend (i.e. long term avg. replacement rate =1)	Clackamas, Sandy [1]	No, No
Sandy River Bright (LRW) Fall Chinook	*Abundance*: 300 spawning wild adults/year *Productivity*: Short term avg. replacement rate (3-year avg. spawners per spawner) projected to result in less than critical threshold number of spawners within 3 years (or) Abrupt declines in escapement (>50% in one year) relative to recent year average)	*Abundance*: 3-year average spawning escapement of 1,500 natural origin fish in index area (or) Average spawner numbers of at least 50% of basin capacity based on MSY escapement level *Productivity:* generally stable or increasing trend (i.e. long term avg. replacement rate =1)	None	N/A
Western Cascade Tule Fall Chinook	*Abundance*: 600 spawning adults/year *Productivity*: Abrupt declines in escapement (>50% in one year) relative to recent year average)	*Abundance*: escapement associated with MSY exploitation rate *Productivity:* generally stable or increasing trend (i.e. long term avg. replacement rate =1)	None	N/A
Coast Range Tule Fall Chinook	*Abundance*: 600 spawning adults/year *Productivity*: Abrupt declines in escapement (>50% in one year) relative to recent year average)	*Abundance*: escapement associated with MSY exploitation rate *Productivity:* generally stable or increasing trend (i.e. long term avg. replacement rate =1)	Various LRH	No
Columbia R. Gorge Tule Fall Chinook	*Abundance*: 300 spawning adults/year *Productivity*: Abrupt declines in escapement (>50% in one year) relative to recent year average)	*Abundance*: escapement associated with MSY exploitation rate *Productivity:* generally stable or increasing trend (i.e. long term avg. replacement rate =1)	Spring Creek	No

[1] *Current releases are Upper Willamette River stock from Clackamas Hatchery. Releases beginning with brood year 2002 smolts will be from wild broodstock obtained within the Sandy Basin.*

Sandy River Spring Chinook: Critical and viable abundance thresholds for Sandy River spring chinook past Marmot Dam were defined as 300 and 2,000 spawners per year, respectively. The viability goal is greater than the 1,250 to 1,875 recommended in NMFS (2000b) and NMFS (1999) (respectively), but is consistent with the interim escapement goal of 2000 in the ODFW Sandy River Subbasin Fish Management Plan (ODFW 1997). Accurate fish counts are available at Marmot Dam but a stock-recruitment relationship has not been modeled for this or other LCR spring chinook populations, making it difficult to estimate an appropriate MSY capacity or exploitation rate for use as a threshold. However, based on Ricker a-values estimated for other Columbia Basin stream-type spring and summer chinook (Schaller et al. 1999), MSY exploitation rates for those populations would average 50% and range from 27% to 74%.

Sandy River Bright (LRW) Fall Chinook: Critical and viability thresholds of 300 and 1,500 natural spawners per year were defined for the Sandy River LRW fall chinook population. The viability threshold is within the range of 1,250 to 1,875 recommended in NMFS 2000b and NMFS 1999 (respectively), and is consistent with the ODFW Sandy River Subbasin Fish Management Plan (ODFW 1997) interim escapement goal for LRW fall chinook of an average of 1,500 spawners annually. Numbers are estimated as expanded peak redd counts in a standard survey index reach between Lewis and Clark State Park boat ramp (RM 2) and Gordon Creek (RM 12). The index count represents a minimum estimate of spawner abundance because some spawning takes place outside the index area, and the expansion factor of 2.5 only accounts for temporal variation, and not for spatial variation or sampling efficiency (e.g. visibility).

The ability to count fish and redds in the index reach provides a direct index of spawning escapement, and removes the effects of fisheries not covered in this FMEP as variables in determining compliance with the standard. A stock-recruitment relationship has not been modeled for this population.

Western Cascade Tule Fall Chinook: The critical threshold for this population complex which includes Sandy and Clackamas populations was defined as 600 spawners per year. Spawner numbers are based on expanded peak redd counts from standard survey index reaches in the Sandy River between Lewis and Clark State Park boat ramp (RM 2) and Gordon Creek (RM 12), and the Clackamas River from the mouth to River Mill Dam (RM 23). The index count represents a minimum estimate of spawner abundance because some spawning takes place outside the survey reaches, both within the subbasin and in other drainages (e.g. Johnson Creek). A viable threshold has not been determined.

The Clackamas River Subbasin Fish Management Plan (ODFW 1992) defined an escapement goal averaging 800 spawners in the standard survey index reach based on historic escapement and harvest levels. The Sandy River Subbasin Fish Management Plan does not list an interim escapement goal for tule fall chinook. The Sandy plan requires continued monitoring of the status of tule and bright fall chinook and maintaining separate escapement estimates for each stock.

Coast Range Tule Fall Chinook: A critical threshold of 600 natural origin spawners per year was identified for the Coast Range tule fall chinook population complex. Spawner escapement is estimated as the sum of expanded peak redd counts from standard survey index reaches in the Lewis and Clark, Youngs, S.F. Klaskanine, N.F. Klaskanine, and Clatskanie rivers, and Bear, Big, Gnat, and Plympton creeks. The index count represents a minimum estimate of spawner abundance because some spawning takes place outside the survey reaches, both within the subbasins and in other drainages (e.g. Scappoose Creek). A viable threshold has not been determined.

Columbia River Gorge Tule Fall Chinook: A critical threshold of 300 spawners per year was identified for the tule fall chinook population complex in the Columbia River Gorge. Spawner escapement is estimated from peak redd counts in Hood River from the mouth to Powerdale Dam (RM 4.5). The index count represents a minimum estimate of spawner abundance because some spawning takes place outside the survey reaches, both within the subbasin and in other drainages (e.g. Herman Creek). A viable threshold has not been determined.

The Hood River Subbasin Summary (CBFWA 2000) defined an interim escapement goal for naturally spawning tule fall chinook of 250 fish downstream from Powerdale Dam. There are no established spawning escapement goals for other subbasins within the Columbia River Gorge tule fall chinook population complex (CBFWA 2000).

1.3.2) Description of the current status of each population (or management unit) relative to its "Viable Salmonid Population thresholds" described above. Include abundance and/or escapement estimates for as many years as possible.

Sandy River Spring Chinook: This spring chinook population exceeded critical viability thresholds for abundance in 2 of the last 3 years and for productivity in 5 of the last 5 years (Table 3). Spring chinook passage estimates for 1988-1999 ranged from 6,328 in 1992 to 1,363 in 1995, and averaged 2,500 (Figure 4).

Wild fish appear to comprise most of the escapement above Marmot Dam in recent years and changes in hatchery and fishery practices are expected to reduce hatchery fish numbers to near zero upstream from Marmot Dam. Wild proportions and numbers averaged about 85% and 2,200 fish between 1996 and 2000 based on CWT mark rates for hatchery releases from Clackamas Hatchery and observed adipose finclips at Marmot Dam. Beginning with the 1992 brood year, all releases of hatchery spring chinook have been made downstream from Marmot Dam, so fewer hatchery fish are expected to seek upstream areas. Beginning with the 1997 brood, all hatchery spring chinook in the Sandy River, and the rest of the LCR and Willamette subbasins, have been mass-marked with adipose finclips. This will allow the selective harvest and removal of hatchery fish at sorting facilities such as Marmot Dam.

Table 3. Wild and hatchery origin spring chinook escapement over Marmot Dam.					
				Wild Esc. at Marmot	
Year	Marmot Counts	Hatchery [1] Percentage	Redds/Mile[2]	Annual[3]	3-Year Average
1996	2,572	4%	29.6	2,460	
1997	3,307	13%	34.0	2,893	
1998	2,616	29%	37.4	1,849	2,401
1999	2,107	15%	13.8	1,801	2,181
2000	2,386	7%	N/A	2,210	1,953
Average	**2,598**	**14%**	**28.7**	**2,243**	**N/A**

[1] *Based on CWT recoveries (Grimes et al. 1996; Lindsey et al. 1997, 1998), Marmot Dam observations for 1999 and 2000 (ODFW unpublished data) and mark rates of hatchery releases in the Sandy River (PSMFC CWT database).*

[2] *From surveys of approximately 18.3 miles of index spawning area upstream from Marmot Dam (Grimes et al. 1996; Lindsey et al. 1997, 1998, 1999).*

[3] *Observations of adipose finclips were not made at either Marmot Dam or during spawning ground surveys prior to 1996.*

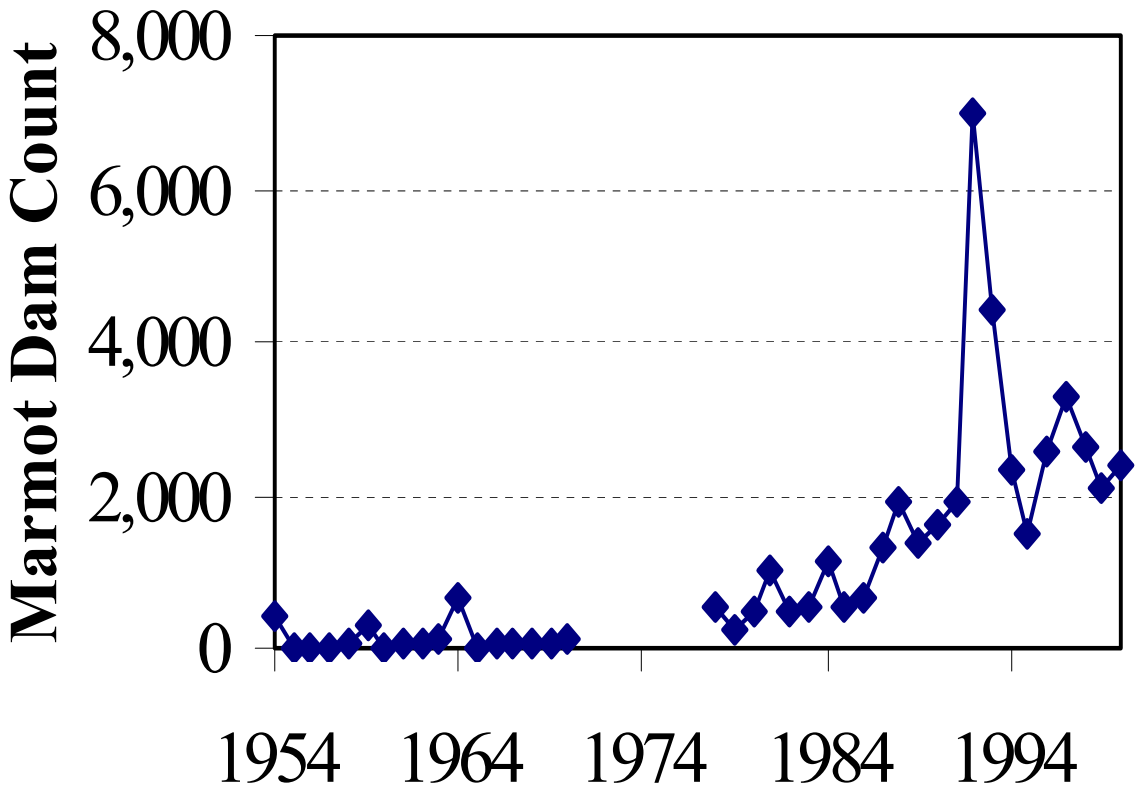

Figure 4. Spring chinook escapement into spawning areas of the Sandy River basin.

Sandy River Bright Fall Chinook: The Sandy River LRW fall chinook population probably exceeded critical thresholds for abundance and productivity until recently. Spawning index counts of LRW Sandy River fall chinook have been made since 1984 for the lower mainstem reach, and have ranged between 88 in 2000 and 2,033 in 1997, with an average of 1,114 (Figure 5). A recent decrease

in escapement, including an abrupt decline from recent 3-year average of 1,130 to 88 in 2000 resulted from a combination of poor ocean survival and impacts from flooding that affected the 1995 and 1996 broods. This trend was also observed in the N.F. Lewis LRW population.

The viability threshold for abundance and productivity has only occasionally been met for Sandy River LRW fall chinook (Figure 5). Complete brood return information is available for 1990-1993 parent broods, with partial, information for 1989, 1994, and 1995 broods. Unfortunately, parent stock size for the 1990 brood was unavailable due to turbid water conditions during spawning ground surveys. An analysis of spawner/recruit estimates for 1989 and 1991-1995 broods indicated that the replacement rate was at least 1.0 for four of the six years (Table 4). Replacement in 1995 was at least 0.34, but less than 0.48 even if age-5 and age-6 data were available and included. It is also likely that the 1990 brood replaced itself with a recruitment of over 2,200. Although the majority of years demonstrated replacement rates of at least 1.0, the indication of a low spawner/recruit ratio for the 1995 brood and the likelihood that the 1996 brood was also affected by flooding, may result in consecutive years with a ratio of less than 1.0.

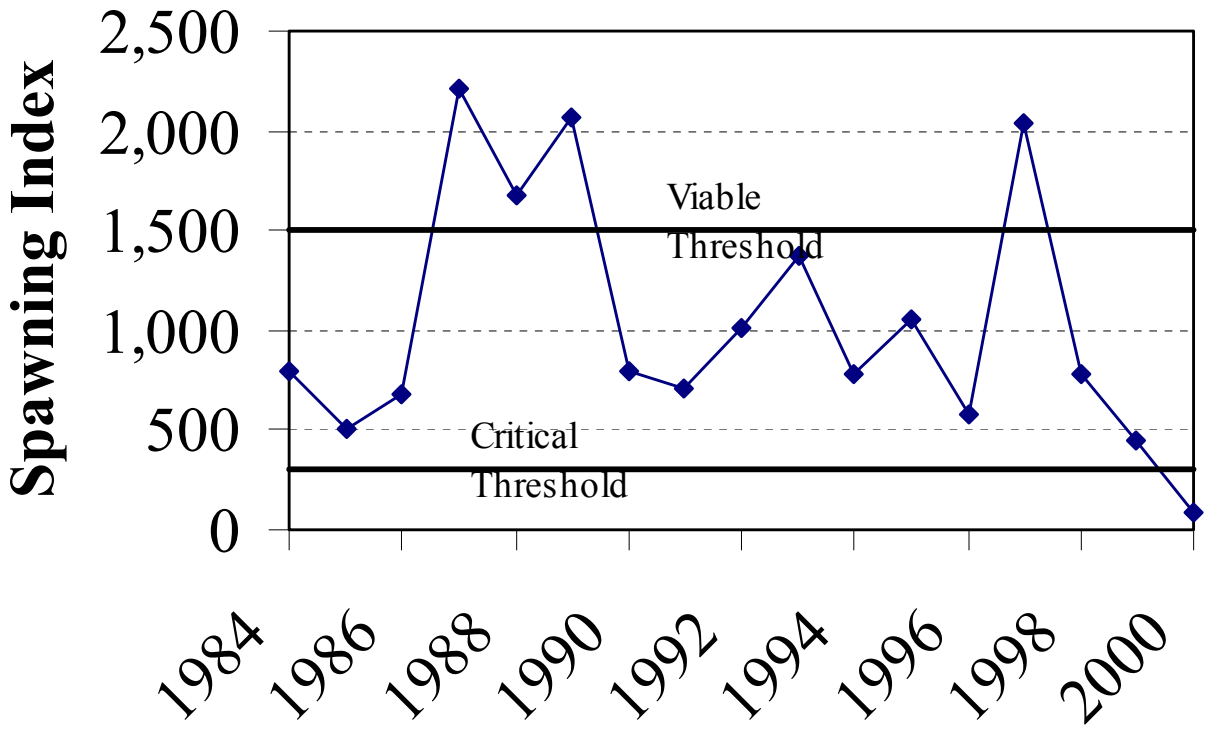

Figure 5. Lower River Wild fall chinook spawning index estimates for the Sandy River Basin.

Table 4. Spawner - recruit data for Sandy River lower river wild fall chinook.				
Brood	Parent Spawners	Ocean Recruits[1]	Recruits per Spawner	3-Year Average
1989[2]	2,060	2,787	1.35	
1990	N/A	2,213		
1991	708	970	1.37	1.36
1992	1,008	898	0.89	1.13
1993	1,380	2,411	1.75	1.34
1994[3]	786	1,698	2.16	1.60
1995[4]	1,055	364	0.34	1.42

[1] *Based on index counts and age composition from spawning ground surveys, expanded by in-basin harvest rates, and age-specific mainstem Columbia River and ocean harvest rates.*
[2] *1989 brood age-2 recruit data was not available so an average of 1992-1999 age-2 abundance at the Columbia River mouth was used.*
[3] *1994 brood age-6 recruit data was unavailable and is not included in this analysis.*
[4] *1995 brood age-5 and age-6 recruit data was unavailable and is not included in this analysis.*

Western Cascade Tule Fall Chinook: Recent wild tule chinook spawning escapements in the Sandy and Clackamas rivers likely do not meet critical thresholds for abundance and productivity. Sandy River tule estimates have averaged 255 with a generally decreasing trend in the three-year rolling average (Figure 6). Clackamas River tule estimates have been less than 200. There appear to be very few first generation hatchery strays spawning in either the Sandy or Clackamas tule populations.

Coast Range Tule Fall Chinook: The spawning escapement of natural origin Coast Range tule fall chinook has probably failed to meet the critical thresholds for abundance and productivity. Although the number of natural spawning fish in the population complex is substantial, most of the fish are first generation hatchery fish (Table 6, Figure 7). In four years of sampling for CWTs, the average expanded recovery estimate indicates that approximately 91% of the fish mark sampled were first generation hatchery strays.

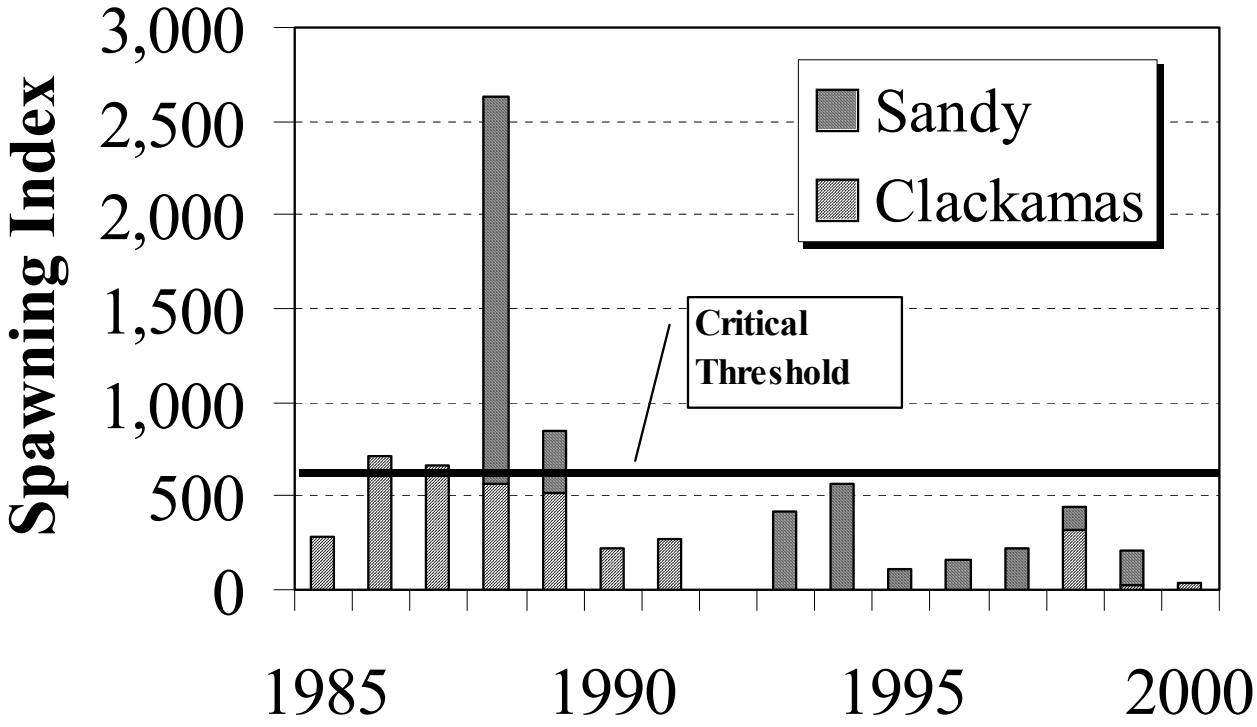

Figure 6. Spawning index counts for Sandy and Clackamas tule fall chinook.

Table 5. Summary of total adult equivalent exploitation rates for an aggregate for tule stocks from the lower Columbia River chinook ESU (CTC unpublished). Reproduced from NMFS 2000b.

Brood	Total	SEAK	Canada	PFMC	Freshwater[1]	Other[2]
1976	0.85	0.01	0.36	0.30	0.14	0.04
1977	0.77	0.03	0.29	0.35	0.09	0.01
1978	0.82	0.03	0.32	0.27	0.07	0.03
1979	0.78	0.03	0.29	0.34	0.09	0.03
1980	0.70	0.02	0.38	0.16	0.09	0.05
1981	0.67	0.03	0.43	0.08	0.10	0.03
1982	0.70	0.03	0.32	0.18	0.15	0.02
1983	0.75	0.02	0.24	0.23	0.23	0.03
1984	0.75	0.02	0.26	0.19	0.25	0.03
1985	0.74	0.02	0.27	0.28	0.15	0.02
1986	0.57	0.03	0.18	0.27	0.06	0.03
1987	0.51	0.06	0.19	0.21	0.05	0.00
1988	0.52	0.03	0.26	0.16	0.06	0.01
1989	0.67	0.03	0.20	0.37	0.06	0.01
1990	0.53	0.02	0.18	0.18	0.12	0.03
1991	0.30	0.03	0.25	0.01	0.01	0.00
1992	0.28	0.02	0.04	0.14	0.07	0.00
1993	0.26	0.06	0.10	0.03	0.07	0.00
1994	0.41	0.00	0.11	0.23	0.07	0.00
1976-90	0.68	0.03	0.27	0.23	0.11	0.02
1991-94	0.31	0.03	0.12	0.10	0.05	0.00

[1] *Includes mainstem Columbia River non-Indian sport and commercial fisheries and tributary sport fisheries.*

[2] *Primarily Puget Sound fisheries.*

Table 6. Wild and hatchery origin tule fall chinook in the Coast Range fall chinook management unit.

Year	Spawning Index	Hatchery %[1]	Redds/Mile[2]	Wild Escapement	
				Annual	3-Year Average
1970-79	2,410	N/A	21	N/A	N/A
1980-89	3,233	N/A	23	N/A	N/A
1990-95	2,385	N/A	15	N/A	N/A
1996	1,405	51%	9	681	N/A
1997	1,328	100%	14	0	N/A
1998	1,206	100%	31	0	327
1999	2,057	78%	24	445	148
2000	2,843	N/A	66	N/A	N/A

[1] *Based on CWT recoveries (Whisler et al. 1998; ODFW unpublished data) and mark rates of lower river hatchery (LRH) stocks (PSMFC CWT database).*

[2] *From surveys of approximately 15 to 23 miles of index spawning areas in nine subbasins (Whisler et al. 1998; ODFW unpublished data).*

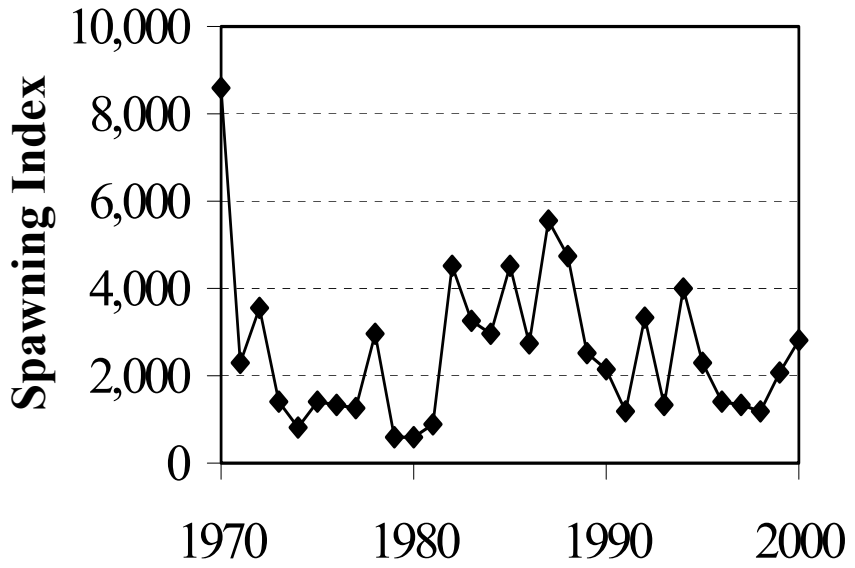

Figure 7. Spawning index estimates for Coast Range tule fall chinook in Oregon.

Columbia River Gorge Tule Fall Chinook: The natural spawning escapement of fall chinook in this management unit has not been estimated, but has probably failed to meet the critical and interim viable thresholds for abundance and productivity. Most spawning is thought to occur in Hood River below Powerdale Dam (RM 4.5). Index surveys have only been conducted sporadically in recent years and turbid water in glacial runoff makes survey conditions difficult. Estimates of adult and jack escapement to Powerdale Dam averaged 24 fish for the years 1992-1999 (Table 7). It does appear that most of the production in the Hood River basin is from natural origin fish, however distinguishing wild from hatchery fall chinook is difficult and this population may annually get strays from Spring Creek National Fish Hatchery.

Recent total exploitation rates for Bonneville Pool hatchery (BPH) tule stocks (Spring Creek NFH stock) have been less than the 65% MSY recovery exploitation rate identified as the viability threshold for abundance. Exploitation rates in mainstem Columbia River fisheries for BPH tule stocks average two to six times that of LRH stocks due to treaty Indian fisheries. Based on the information in Table 5, and assuming that ocean fishery impacts are similar for LRH and BPH tule stocks, we estimate that total exploitation on Hood River tule fall chinook averaged 80% for 1976-1990 broods, and 58% for 1991-1994 broods.

Table 7. Tule fall chinook sampled at Powerdale Dam on the Hood River.				
			Wild Escapement	
Year	Dam Count	Hatchery %[1]	Annual	3-Year Average
1992	22	24%	17	N/A
1993	10	40%	6	N/A
1994	39	19%	31	18
1995	12	33%	8	15
1996	16	13%	14	18
1997	30	8%	28	17
1998	40	11%	36	26
1999	19	0%	19	27
Average	**23.5**	**19%**	**20**	**N/A**

[1] *Based on scale sample analysis.*

1.4) Harvest Regime

This FMEP primarily addresses fisheries within Oregon tributaries of the LCR ESU that target on spring and fall chinook, winter steelhead, and coho, although impacts from other fisheries are considered. A primary goal of management conducted by ODFW is to limit combined ocean and freshwater fishery impacts at or below levels which preserve and recover wild fish populations. Fisheries for fall chinook within the tributaries are largely restricted to protect naturally spawning fish and hatchery returns. Many hatchery releases of summer steelhead and catchable trout have been discontinued to eliminate potential fishery conflicts with listed adults and smolts. Management of fisheries for species other than chinook including coho, steelhead, trout, shad, and warmwater fisheries has been tailored to minimize impacts on wild chinook adults and juveniles.

1.4.1) Provide escapement objectives and/or maximum exploitation rates for each population (or management unit) based on its status.

Table 8 describes historical freshwater harvest rates and projected freshwater harvest rates for the major population complexes in the Lower Columbia River chinook ESU based on returns to the Columbia River mouth. Projected harvest rates are based on average historical rates and include anticipated effects of management actions proposed in this FMEP.

Table 8. Freshwater fishery impact rates on Lower Columbia River wild chinook[1]. The impact rates listed below are cumulative fishery impacts in ocean, mainstem Columbia, and tributary fisheries.

	1984-93	1994-98	1999	2000[2]	2001	2002 & beyond Avg.	2002 & beyond Max.
Spring Chinook Fishery[3]							
L. Col. Commercial[4]	9.3%	0.7%	0.5%	0.6%	-- [5]	4.0%	11.5%
L. Col. Sport	2.9%	0.5%	0.0%	0.4%	-- [5]	0.3%	0.7%
Sandy Sport	37.8%	37.5%	39.2%	<40.0%	<40.0%	4.2%	6.1%
Fall Chinook Fisheries							
Sandy R. LRW	22.4%	20.7%	n/a	n/a	<21.0%	2.2%	3.8%
W. Cascade Trib. Tule	14.7%	11.7%	n/a	n/a	8.8%	1.2%	3.0%
Coast Range Trib. Tule	16.8%	25.5%	n/a	n/a	25.0%	25.0%	<RER
Col. R. Gorge Trib. Tule	n/a	n/a	n/a	n/a	<10%	<10%	<RER
Total by population [6,7]							
Sandy R. Spring Chinook	50.0%	38.8%	39.7%	<41.0%	-- [5]	<8.6%	18.3%
Sandy R. LRW	36.9%	30.6%	n/a	n/a	-- [5]	<20.0%	<40%
W. Cascade Trib. Tule	48.3%	19.5%	>14.5%	>17.2%	-- [5]		<RER
Coast Range Trib. Tule	50.4%	33.3%	>14.5%	>17.2%	-- [5]		<RER
Col. R. Gorge Trib. Tule	>53.4%	>46.3%	>61.0%	>38.7%	-- [5]		<RER

[1] *Lower Columbia fishery rates are estimated in statistical sampling programs. Tributary sport fishery impacts are estimated from catch record cards returned by anglers. Catch record card returns are biased high (Zhou and Zimmerman 2000).*

[2] *Preliminary*

[3] *Columbia River fishery impact rates are based on Willamette River spring chinook, and assumed to be identical for Sandy River spring chinook.*

[4] *Includes mainstem salmon/sturgeon fisheries and Oregon "Select Area" terminal fisheries.*

[5] *To be determined by negotiations for management agreements in the U.S. v. Oregon forum.*

[6] *Totals include an estimated impact of less than 1% to account for other fisheries (e.g., trout, warmwater, etc.)*

[7] *RERs may be periodically revised by NMFS. RERs include both freshwater and ocean harvest, so maximum freshwater impacts are expected to be much lower than RERs*

Sandy River Spring Chinook: With the implementation of selective fisheries for fin-clipped hatchery fish in 2002, total freshwater fishery impacts on Sandy River spring chinook are expected to be reduced to 8.6% from historic annual rates of 40-50% (Table 8). Expected rates are substantially less than the 30% maximum annual rate limit identified as "safe" by a population viability risk assessment (see section 2.1).

Release requirements for nonfin-clipped wild fish in selective fisheries will reduce sport fishery impacts to very low levels. Large-scale marking of hatchery spring chinook in the Willamette and Sandy basins began with the 1997 brood year. Upper Willamette River and Sandy River spring chinook return primarily at age-4 and age-5 with smaller numbers of age-3 jacks and age-6 adults. Almost all of the age-3 hatchery fish returning in 2000 were adipose fin-clipped. In 2001, virtually all of the age-3 and age-4 hatchery fish will be clipped. In 2002, all returning hatchery fish except age-6 adults will be adipose fin-clipped.

Wild fish impacts in selective fisheries result from handling mortality and an expected very low rate of noncompliance with wild release requirements (Table 9). Annual rates vary with maximums observed in years of optimum fishing

conditions and maximum effort. Years of high rates are balanced by years of low rates such that actual annual impacts fluctuate about the average. Sensitivity analyses indicate that: 1) fishery impacts remain under the 30% maximum average annual rate goal even if incidental handling impacts are substantially greater than expected, and 2) fishery impact rates may be much less than the 30% maximum average annual rate goal if incidental handling impacts are less than expected (Table 9). Ongoing double index tagging experiments will help identify actual catch and release impacts on spring chinook when selective fisheries are fully implemented.

Sandy Basin harvest rates for spring chinook ranged from about 24% to 51% between 1984 and 1999, and averaged 38% (Table 8) although estimates based on catch record cards are probably overestimates (Zhou and Zimmerman 2000). During 2001 until all returning hatchery fish are adipose finclipped, the OFWC continued a non-selective fishery in the Sandy Basin on spring chinook. It was unlikely that year 2001 fishing rates of up to 40% would have appreciably affected wild population survival and recovery prospects where future rates are further reduced by selective fishery implementation.

Impacts to Sandy River spring chinook in Columbia River mainstem fisheries are assumed to be similar to Willamette River spring chinook because of the close association of the hatchery programs and their influence on the naturally spawning populations. Past mitigation releases of hatchery spring chinook in the Sandy originated from Willamette stock reared at Clackamas Hatchery. The resurgence of natural spawning in the Sandy River followed releases of hatchery spring chinook in the upper Sandy basin, which indicates that the naturally spawning component may have significant influence from Willamette stock. Mainstem Columbia River harvest impacts on UWR spring chinook averaged an estimated 9.3% for the years 1981-1997. Impacts in 1998-2000 are estimated to have averaged less than 0.4%. Monitoring and evaluation of the new endemic broodstock spring chinook program that began in with 2002 releases will determine if the mainstem Columbia River harvest of this locally adapted stock is different from the Willamette stock.

Table 9. Projected future harvest rates of Sandy River spring chinook in selective sport fisheries.

Sport	Years	Handle rate[2]		C & R[3]	Non	C&R mortality		Non comp. mort		Repeat capture rate		Repeat capture mort		Total impacts	
Fishery	included[1]	Avg	Max	mort rate	Comp.[4]	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Expected Impacts															
L. Columbia	90-99	5.1%	18.6%	8.6%	2.0%	0.43%	1.57%	0.10%	0.37%	0.1%	0.4%	0.01%	0.04%	0.54%	1.98%
Sandy	90-99	40.4%	57.9%	8.6%	2.0%	3.42%	4.90%	0.79%	1.14%	7.3%	16.2%	0.01%	0.04%	4.22%	6.08%
Sensitivity Analysis to Greater and Lesser Catch and Release Mortality Rates															
L. Columbia	90-99	5.1%	18.6%	12.9%	2.0%	0.65%	2.36%	0.10%	0.37%	0.1%	0.4%	0.01%	0.06%	0.76%	2.78%
Sandy	90-99	40.4%	57.9%	12.9%	2.0%	5.12%	7.34%	0.79%	1.14%	7.3%	16.2%	0.01%	0.06%	5.93%	8.54%
L. Columbia	90-99	5.1%	18.6%	4.3%	2.0%	0.22%	0.79%	0.10%	0.37%	0.1%	0.4%	0.01%	0.02%	0.32%	1.18%
Sandy	90-99	40.4%	57.9%	4.3%	2.0%	1.71%	2.46%	0.80%	1.14%	7.3%	16.2%	0.01%	0.02%	2.52%	3.62%

[1] *Most recent 10-years representing expected future fishery.*
[2] *Handle rate relative to run size. Maximum annual handling rates were identified based on maximum handle rates observed in historic fisheries.*
[3] *Catch and release mortality rate based on Schroeder et al. (1999) research study results. Expected rate is 8.6%. Sensitivity analysis based on arbitrary 50% increase and decrease of average value.*
[4] *Expected non-compliance (% of landed nonfinclipped catch that is illegally retained). Similar to ocean fishery modeling estimates.*

Sandy River Bright (LRW) Fall Chinook: Chinook salmon regulations in the Sandy River recently changed to allow only fin-clipped chinook to be retained from February 1st through October 31st. Therefore harvest of LRW fall chinook will be significantly reduced compared to historical harvest rates (Table 8). Nearly all of the freshwater impacts on LRW fall chinook will occur in the mainstem Columbia River and are expected to average less than 20% (Table 8). A stock recruitment relation has not been determined for this population making it difficult to estimate an appropriate exploitation rate. As a result, Sandy River bright fall chinook are managed according to escapement levels of the Lewis River fall chinook population. An escapement goal of 5,700 was established for Lewis River fall chinook based on spawner recruit analysis (McIsaac 1990). This escapement level has been met every year since 1980, except in 1999. Severe flooding in 1995 and 1996 led to limited egg and fry survival for those brood years. More conservative fishing rates are adopted in years of poor escapement.

Most fishery impacts on listed LRW chinook in the Sandy basin occur as incidental catches in the coho fishery (September 1 to October 31), and the winter steelhead fishery, although some target chinook fishing has occurred early in the season while the LRW fish are still in good condition. There are no hatchery fall chinook releases in the Sandy River basin. Therefore retention of fall chinook will be non-existent or very low during the open season for fin-clipped chinook salmon. The primary fall chinook spawning area has been closed to fishing from September 16 to November 15.

The ODFW annually reviews angling regulations during a several month long public process for implementation effective January 1 of the following year. To provide additional protection for listed fall chinook, retention of all wild (nonfinclipped) chinook salmon in the Sandy Basin is prohibited beginning in 2002. The Sandy River Subbasin Fish Management Plan currently allows in-basin harvest when the population is meeting the escapement goal, although the primary spawning area is closed and retention is prohibited in other areas most of the spawning season. When the population is depressed or below critical levels, the Plan requires additional measures to be taken to reduce harvest pressures. Actions to restrict in-basin harvest of LRW fall chinook are identified if spawning escapement is trending down below 750 fish in established index areas. Currently the population is below critical levels due to flood events in 1995 and 1996. Although recent harvest rates have been less than in the past, spawning escapement has declined since 1997 to a record low 88 fish in 2000.

Closure of the Sandy basin to fall chinook retention in 2002 would reduce the within basin impact rate to an annual average of 2.2% with an annual maximum of less than 4% (Table 8). Sandy Basin harvest rates for LRW fall chinook ranged from about 17% to 31% between 1984 and 1993, and averaged 22% (Table 8), although these estimates based on catch record cards are probably overestimates (Zhou and Zimmerman 2000). Between 1994 and 1998, Sandy Basin harvest rates ranged from less than 3% to 36%, and averaged 21%.

Mainstem Columbia River harvest management assumes Sandy River LRW chinook have similar impacts to the North Fork Lewis LRW population because

the stocks are genetically similar, and have similar run timing and life history characteristics. Mainstem Columbia River harvest rates for Lewis River LRW fall chinook ranged from about 8% to 25% between 1984 and 1993, and averaged 15% (Table 8). Between 1994 and 1999, mainstem Columbia River harvest rates ranged from less than 3% to 18%, and averaged 10%. The states of Oregon and Washington managed ocean and freshwater fisheries to limit impacts to LRW chinook to less than 10% when escapement is projected to be less than goal. This guideline has been applied to LRW chinook between 1998 and 2000. The Sandy River LRW population receives similar protection when the Lewis River population is depressed.

Western Cascade Tule Fall Chinook: Chinook salmon regulations recently changed in the Sandy and Clackamas rivers to allow only fin-clipped chinook to be retained. All unmarked fish must be released. Total freshwater fishery impacts on Sandy and Clackamas river tule fall chinook (including mainstem Columbia and select area fisheries) are expected to average less than 40% (Table 8). Annual rates are adjusted based on run size expectations with more conservative fishing rates in years of low escapements. Combined average harvest rates in ocean, mainstem Columbia, and tributary fisheries will not exceed the Rebuilding Exploitation Rate (RER) specified in NMFS' section 7 consultations for fisheries managed by the Pacific Fishery Management Council and parties of US v. Oregon. The RER for Lower Columbia River fall chinook stocks in 2002 is 49%.

The majority of freshwater harvest impacts to tule stock chinook occur in mainstem Columbia River sport and commercial fisheries. Impacts are determined by hatchery escapement needs, and account for normal levels of straying by hatchery stocks into natural production areas. Mainstem Columbia River harvest rates for LRH tule fall chinook ranged from about 13% to 63% between 1984 and 1993, and averaged 34% (Table 8). Between 1994 and 1999, mainstem Columbia River harvest rates ranged from less than 1% to 15%, and averaged 9%. Total freshwater harvest rates (including mainstem Columbia and select area fisheries) ranged from averaged 48% and 20% for the same periods.

The proposed harvest regime for this management unit is to further restrict fisheries in the Willamette, Clackamas, and Sandy rivers by prohibiting retention of nonfin-clipped wild fall chinook in 2002. Harvest impacts on tule fall chinook in Oregon tributaries are primarily incidental to fisheries that target surplus hatchery coho. The flesh quality of tule chinook is low by the time they reach the tributaries, and fish move rapidly to spawning areas providing little fishing opportunity in prime holding waters. The primary spawning area in the Sandy Basin is also closed to fishing when adult chinook are present. Based on catch record card harvest estimates, in-basin harvest rates for Sandy and Clackamas tule fall chinook ranged from about 4% to 29% between 1984 and 1993, and averaged 15% (Table 8), although these estimates based on catch record cards are probably overestimates (Zhou and Zimmerman 2000). Between 1994 and 1998, harvest rates ranged from less than 5% to 22%, and averaged 12%. Future in-basin harvest rates for the West Cascades tule fall chinook population complex are projected to average 1.2%, with an annual maximum of 3.0% (Table 8).

Coast Range Tule Fall Chinook: Tule fall chinook management within the tributaries making up the Coast Range tule fall chinook management unit is focused on achieving hatchery escapement goals and protecting natural spawning areas. Harvest impacts for lower river tules are determined by hatchery escapement needs, and account for normal levels of straying by hatchery stocks into natural production areas. Harvest rates on wild fall chinook in this management unit are tailored to ensure that average harvest rates do not exceed the RER specified by NMFS' section 7 consultations for PFMC and US v. Oregon fisheries. The RER for fisheries in 2002 for these stocks is 49%. As long as mitigation and fishery augmentation hatchery programs, such as those funded by the Mitchell Act, are present in the lower Columbia River and operate under current practices, the naturally spawning populations will be heavily influenced by hatchery strays.

Harvest impacts on tule fall chinook in Oregon tributaries are primarily incidental to fisheries that target surplus hatchery coho. The flesh quality of tule chinook is low by the time they reach the tributaries, and fish move rapidly to spawning areas providing little fishing opportunity in prime holding waters. Most of the tributaries upstream from Youngs Bay are closed to chinook angling during peak spawning migrations. Youngs Bay tributaries are open to chinook angling in an effort to maximize harvest on hatchery spring chinook, SAB fall chinook, and coho that are part of the Select Area Fishery Program. Based on catch record cards, in-basin harvest rates for this management unit ranged from 9% to 39%, and averaged 20% between 1984 and 1998 (Table 8), although these estimates based on catch record cards are probably overestimates (Zhou and Zimmerman 2000). Total freshwater harvest rates (including mainstem Columbia and Select Area fisheries) ranged from 9% to 76%, and averaged 45% for the same period. Future in-basin harvest rates for the Coast Range tule fall chinook population complex are projected to average 25%, with an annual maximum of 40%. Total harvest rates (including mainstem Columbia and select area fisheries) will not exceed RERs determined by NMFS for the PFMC.

Columbia River Gorge Tule Fall Chinook: Fall chinook stocks in this management unit are managed primarily to meet hatchery escapement goals. The management intent is to ensure average harvest rates do not exceed the RER specified in NMFS' section 7 consultations for PFMC and US v Oregon fisheries for this management unit..

Most subbasins in this management unit are too small to support independent chinook populations, with the exception of Hood River. As long as mitigation and fishery augmentation hatchery programs, such as those funded by the Mitchell Act, are present in the lower Columbia River and operate under current practices, the naturally spawning populations will be influenced by hatchery strays.

Fisheries in this management unit are structured to ensure hatchery escapement goals are met, and to provide protection for naturally spawning chinook, while allowing access to surplus hatchery returns. Most tributaries of the Columbia River Gorge tule fall chinook management unit are closed to chinook angling during peak spawning migrations. Only Herman Creek and Hood River are open

to chinook retention at that time. Harvest impacts on tule fall chinook in these tributaries are near zero and occur primarily incidental to fisheries that target surplus hatchery steelhead. Historical estimates of in-basin harvest rates for this management unit are not available, but likely average less than 10%. Estimated total impacts in the lower Hood River were two chinook kept and 10 released in 1998, and two kept and two released in 1999. Mainstem Columbia River harvest rates ranged from 29% to 69%, and averaged 52% for BPH stocks between 1984 and 1998 (Table 8). Future in-basin harvest rates are projected to average less than 10% with an annual maximum of less than 15%. The harvest rate is expected to decline as fin-clipped only retention regulations are implemented in the Hood River beginning in 2004. Total freshwater harvest rates (including mainstem Columbia and select area fisheries) will not exceed RERs determined by NMFS for the PFMC.

1.4.2) Description of how the fisheries will be managed to conserve the weakest population or management unit.

For spring chinook there is only one population within the management unit, the Sandy River population. The 30% equivalent average harvest rate guideline was applied to this populations based on the most pessimistic combination of assumptions of underlying stock productivity and conversion mortality (survival between Marmot Dam and spawning grounds). In addition, there is no retention of wild chinook in the Sandy River basin. All impacts will be associated with catch and release mortality and illegal take.

For fall chinook, most populations are not subject to in-basin target fisheries. In many basins, retention of fall chinook is not allowed and spawning areas are closed to fishing altogether. The retention of wild fall chinook is prohibited in the Sandy, Clackamas, and Willamette rivers, thereby reducing tributary fishery impacts to Clackamas and Sandy tule fall chinook populations.

The WFMP requires that ODFW oppose harvest strategies that are primarily responsible for populations declining below 300 fish. Therefore, any population that is declining towards or below 300 spawners would receive additional protection from harvest.

1.4.3) Demonstrate that the harvest regime is consistent with the conservation and recovery of commingled natural-origin populations in areas where artificially propagated fish predominate.

Artificially propagated fish predominate (or are exclusive) in the Coast Range fall chinook management unit. The harvest regime prohibits fishing or retention of chinook in most natural spawning areas within this management unit. The harvest regime is designed to ensure hatchery escapement goals for tule stock chinook are met which should preserve the remaining genetic legacy of this population complex. The harvest regime in the summer and fall Youngs Bay Select Area fishery is designed to remove nearly all SAB returns and prevent this stock from reproducing in the wild.

1.5) Annual Implementation of the Fisheries

The coordination and integration of numerous fora and processes are required to implement fisheries consistent with conservation and use goals. This FMEP represents one of those processes, and as such must account for impacts from other fisheries.

Ocean Processes: Ocean harvest management takes place in the Pacific Fishery Management Council and Pacific Salmon Treaty fora. Ocean and inriver fishery allocation decisions are closely related and implemented in an annual process. ESA coverage for ocean fisheries normally takes place through Section 7 consultation. This consultation specifies the RERs for LCR salmon stocks to guide cumulative harvest impacts in all ocean and freshwater fisheries. Fisheries will be managed so that the RERs are not exceeded in a given year.

Columbia River Processes: The process for setting in-basin fisheries is closely related and concurrent with the process for establishing sport and commercial seasons in the lower Columbia River. Commercial seasons in concurrent Oregon and Washington waters of the Columbia River are regulated by a joint Oregon and Washington regulatory body (the Columbia River Compact) in a series of public hearings which begin in January for winter and spring fisheries, and in August for fall fisheries. The ODFW and WDFW directors or their delegates comprise the Compact and act consistent with delegated authority by the respective state commissions. Sport seasons in concurrent waters are adopted by the individual states, but great effort is expended to ensure a coordinated process occurs between Oregon and Washington which results in consistent regulations.

Columbia River seasons are also regulated by the *U. S. v. Oregon* process which dictates sharing of Columbia River fish runs between treaty Indian and non-Indian fisheries. Mainstem Columbia River harvest management is normally based on annual agreements between the parties to *U. S. v. Oregon* and implemented though the Columbia River Compact. ESA coverage for mainstem Columbia River and ocean fisheries normally takes place through Section 7 consultation. Impacts on upriver spring and fall chinook and steelhead in Columbia River fisheries are not subject to this FMEP and are addressed by Section 7 consultations for *U. S. v. Oregon* fisheries. Because the Section 7 process is an annual process in many cases, it is important that harvest levels in this FMEP are considered as part of those processes as well. The RERs specified in the section 7 consultations will be used to manage cumulative harvest rates in ocean and freshwater fisheries.

Subbasin Management Planning Process: Management objectives and measures for tributary fish populations and fisheries are detailed in plans for key subbasins which are periodically revised following a lengthy public review process and adopted by the OFWC. Fisheries in the Willamette, Sandy, and Clackamas rivers are managed based on subbasin plans.

Spring chinook chapters of the Willamette management plan were revised in 1998 in part to provide increased protection for wild fish (ODFW 1998). The revised plan is scheduled to sunset in 2002 and was intended to bridge a period of transition to selective fisheries for adipose fin-clipped hatchery fish. The plan identifies harvest rates in mainstem Columbia River and lower Willamette River fisheries which vary from 0% to 40% (of return to the mouth of the Columbia) depending on aggregate wild/hatchery run

size. The OFWC has adopted more conservative fishing rates than those identified in the current plan for 1998, 1999, 2000, and 2001 to ensure an increasing trend in wild UWR spring chinook escapement. The annual spring chinook fishery regulation process is expected to be considerably streamlined beginning with year 2002 when all freshwater spring chinook fisheries will be selective for marked hatchery fish. Permanent rules will allow retention of only adipose fin-clipped chinook salmon and will require immediate release of fish without adipose finclips. Unless wild populations fall below critical thresholds or when scheduled periodic reviews of this plan mandate fishery modifications, annual fishery implementation is likely to be limited to routine fishery and escapement monitoring, and dissemination of inseason and post season updates. Annual implementation of Columbia River mainstem fisheries will continue to depend on *U. S. v. Oregon* processes and the status of other Columbia and Snake River stocks.

A Sandy River Basin Fish Management Plan was adopted by the OFWC in 1997. The plan is scheduled for amendment in 2001 to address the proposed decommissioning of Marmot and Little Sandy dams. Portland General Electric has stated their intent to decommission Marmot and Little Sandy dams prior to expiration of the FERC license in 2004. Options for decommissioning include a range of outcomes from complete removal of all barriers, to installation of a permanent low-head barrier to sort hatchery and wild fish, to leaving Marmot Dam and fish ladder in place. The OFWC is currently in the process of amending the current Sandy River Basin Fish Management Plan in to provide a management strategy that will allow ESA and WFMP guidelines to be met with the new configuration. If the final configuration removes all barriers, alternative fishery regulations, hatchery practices, and methods for estimating spawning escapement may be necessary. The relationship between Marmot Dam counts and spawning ground survey data is weak, necessitating additional assessment of survey methodology.

Permanent Regulation Process: Specific fishery regulations consistent with subbasin management plan goals and objectives are based on a quadrennial angling regulation review process that includes ODFW staff and public input. This process addresses regulations for all fisheries addressed by this FMEP (salmon, trout, warmwater, shad, sturgeon, smelt, etc.). Permanent rules are developed in a state-wide angling regulation process which is currently conducted at 4-year intervals. A 1996 public involvement process established angling regulations from 1997 through 2000. The public process for 2001 through 2004 regulations began in September 1999 and was completed in 2000. The public process involved 1) solicitation of proposals for regulation changes from ODFW staff, Oregon State Police (OSP), and the public, 2) categorization of proposals for substance and opportunity by a Regulation Review Board which includes representatives from the public, ODFW, OSP, OFWC, and the Oregon Governor's office, 3) review of proposals in a series of 7 public meetings held around the state, and 4) review and adoption of rules by the OFWC at public commission meetings in August and September 2000. New sport regulation pamphlets were prepared and printed in October and November 2000 and new regulations took effect on February 1, 2001.

There is also a process in place to implement regulations on a much shorter time schedule than every four years that addresses emergency conditions. Such emergency regulations can be adopted by the Commission within 2 weeks if a Commission meeting is scheduled near the same date. The Commission has also delegated to the Director of ODFW the authority to adopt emergency regulations. If the Director adopts emergency regulations,

they can be implemented within a matter of days from the time they are submitted. ODFW will consult with NMFS regarding the proposed regulations changes prior to implementation to ensure that effects on listed LCR chinook salmon will be consistent with limitations described in this FMEP.

EFFECTS ON ESA-LISTED SALMONIDS

2.1) Description of the biologically-based rationale demonstrating that the fisheries management strategies will not appreciably reduce the likelihood of survival and recovery of the affected ESU(s) in the wild.

Assessments of the effects of proposed fishing levels on survival and recovery likelihoods for spring chinook were based on a quantitative population viability analysis (PVA). Population Viability Analysis is a widely applied and useful conservation assessment tool for evaluating specific harvest actions where used in conjunction with a Viable Salmonid Population concept as described by the NMFS to identify abundance levels necessary for long-term survival (Burgman 1993, McElhany et al. 2000).

Assessments of fall chinook survival and recovery prospects were based on comparison of population parameters and harvest rates among populations because there was insufficient information available to conduct PVAs for fall chinook in this ESU. Harvest rates at or less than MSY exploitation rates were recommended in NMFS 1999 and NMFS 2000b as appropriate targets that should allow populations to persist into the future. For 2002 fisheries, NMFS recommended a RER not to exceed 49% for the Coweeman tule fall chinook stock. This RER is used as a surrogate for other fall chinook stocks in the LCR ESU where a natural escapement target has not been established. Where possible we have estimated MSY harvest rates for populations in this FMEP based on estimates from other related populations as a gauge for determining if harvest strategies will appreciably reduce the likelihood of survival and recovery. In some cases, inference based on historical abundance and harvest rates was the only rationale available due to lack of information.

Based on previous catch card information on fall chinook harvest in the tributaries of the Lower Columbia River, overall harvest has been low in the tributaries (Table 10). Most of the catch of fall chinook in freshwater occurs in the Lower Columbia River. In many of the tributaries, regulations have been changed recently to reduce harvest impacts in these areas by prohibiting angling during peak spawning in September (e.g. Bear Creek, Big Creek, Gnat Creek), allowing only finclipped fall chinook to be retained (e.g. Sandy River), or prohibiting all angling for salmon during the run (e.g. Tanner Creek, Herman Creek, Eagle Creek). These changes will reduce the harvest of chinook even further than historical catches reported in Table 10.

Table 10. Sport catch of fall chinook salmon in Oregon tributaries of the Columbia River system, 1985-97 (1997-98 is the last year data is available). The lower Columbia River fishery is authorized via US v. OR consultations.

	Run Year												
Stream	**1985-86**	**1986-87**	**1987-88**	**1988-89**	**1989-90**	**1990-91**	**1991-92**	**1992-93**	**1993-94**	**1994-95**	**1995-96**	**1996-97**	**1997 98**
Bear Creek (Clatsop Co)	98	0	0	19	0	6	3	3	8	3	3	0	12
Big Creek (Clatsop Co)	585	318	412	1,000	993	494	369	521	513	326	957	1,001	592
Clackamas River, Lower	81	49	82	66	112	48	107	117	69	50	99	102	147
Clatskanie River	8	26	63	31	19	19	6	0	0	6	30	20	0
Columbia River, Lower	2,513	6,380	16,437	17,540	11,953	5,758	9,070	5,342	6,311	405	3,529	11,663	15,57
Gnat Creek (Clatsop Co)	133	217	1,461	906	840	79	46	28	26	9	0	20	13
Herman Creek	0	0	0	0	0	6	40	6	12	9	12	17	6
Hood River	12	15	20	16	7	6	3	10	0	19	70	13	56
Klaskanine River	72	47	83	262	135	9	21	0	20	24	22	10	62
Lewis and Clark River	75	23	223	172	94	3	15	3	8	0	0	3	6
Sandy River Below Marmot Dam	185	305	735	481	549	282	420	244	406	28	410	387	473
Scappoose Creek	0	0	0	0	0	0	0	0	0	0	0	10	0
Willamette River, Lower	48	36	20	58	93	83	117	20	65	51	119	62	67
Youngs River & Bay	4	0	10	31	7	0	0	0	0	6	0	21	64

Sandy River Spring Chinook: A quantitative Population Viability Analysis indicates that selective fisheries which eliminate mortality from retention of wild fish will ensure protection and recovery of wild Sandy River spring chinook even under worst case assumptions for wild stock productivity (Table 10). Risks associated with the expected 8.6% impact are not appreciably greater than risks with no fishing. Expected fishery impacts of 8.6% are also much less than the maximum rates of 30% identified for Sandy River spring chinook based on risk assessment survival and recovery likelihoods and standards consistent with those identified for UWR spring chinook (ODFW 2000). Note that the PVA identified 30% as the impact rate limit for Sandy River spring chinook rather than the 15% derived for UWR spring chinook. The Willamette limit was less because Santiam and McKenzie river populations are subject to significant conversion mortality in the upper Willamette to which Sandy River spring chinook are not exposed. Recent wild fish escapements in the Sandy River were also greater than starting population sizes for upper Willamette populations.

The risk assessment indicates that it will not be necessary to manage fisheries for the average rate (8.6%) in each individual year. The assessment explicitly considers the effects of annual variation in ocean and freshwater fishing rates, data uncertainty and errors, and variability in natural mortality rates. Maximum annual freshwater fishing impact rates of 18.3% expected in years of optimum fishing conditions and high angler effort are still under the 30% limit. Even if they were not, the risk assessment indicates that greater-than-average impacts are acceptable in some years as long as they are balanced by years with lower-than-average rates.

These risk assessment results are conservative because the PVA was based on worst-case productivity assumptions. Model results depend on population productivity, which is the relative number of offspring produced by a given number of spawners. Extinction risk is typically defined solely in terms of fish numbers: too few spawners result in a spiral toward extinction. Recovery is typically defined in terms of fish numbers and population productivity. Above low threshold numbers, population productivity is much more important than absolute spawner numbers. Productive populations have a higher average population size, rebuild quickly after poor ocean cycles, and can easily sustain incidental harvest impacts. A small, productive population will fare much better over the long term than a large, unproductive one. Productivity is related to habitat quality and recovery in degraded systems ultimately depends on habitat improvements. Low productivity rates for other Columbia basin spring chinook were used in the PVA because we lack information on the productivity of the UWR and Sandy River populations. Actual productivity is probably greater and productivity is also likely to increase in the future especially if the wild stock benefits from reduced hatchery influences.

Risk assessment results generally corroborate the use of an MSY harvest rate limit for stocks where data are otherwise insufficient for a formal risk assessment based on population viability analysis and the population is not at critical low run sizes. The 30% average annual rate which meets preservation and recovery standards for Sandy River spring chinook is approximately equivalent to the MSY harvest rate for the worst case stock productivity we assumed. The actual MSY rate is 32% where the Ricker a-value

= 0.7 and replacement abundance is 4,000. Corresponding replacement spawner and recruit numbers are 1,800 and 2,700, respectively.

Table 11. Results of a quantitative Population Viability Analysis risk assessment of fishing impacts on wild Sandy River spring chinook based on worst case estimates of population productivity and capacity.[1]

	Quasi-extinction Risk [2]	Large Run Probability [3]	"Recovery" Probability [4]	Equilibrium Escapement [5]
Planned vs. historic fishing rates				
Standard [6]	***≤ 1%***	***≥ 10%***	***≥ 50%***	***2,000***
FMEP rate (8.6%)	< 0.1%	46%	97%	3,500
1984-2000 avg. (48%)	2%	3%	1%	850
Other fishing rates				
No fishing	< 0.1%	54%	99%	4,000
15% average annual rate[7]	< 0.1%	38%	90%	3,200
30% average annual rate[8]	< 0.1%	20%	50%	2,100

[1] *Worst case assumptions are represented by low inherent stock productivity (Ricker a = 0.7), strong depensation at escapements of less than 300, average smolts per spawner of 68.0, average smolt to adult survival of 1.67%, average ocean fishing rate of 12%, and stochastic variation in fishing rates, freshwater survival, and ocean survival (ODFW 2000).*

[2] *Quasi-extinction risk based on the frequency of wild escapement of less than 300 fish within 30 years.*

[3] *Large run probability based on frequency exceeding 75% of replacement abundance within 30 years (i.e. 3,000 spawners).*

[4] *Based on last 8-year average run size exceeding interim subbasin plan goal (2,000 fish past Marmot Dam) which for purposes of this exercise is assumed to represent 50% of the basin capacity which we defined as replacement abundance in the Ricker stock-recruitment equation (i.e.4,000 spawners).*

[5] *Average run size during last 8-years of simulation.*

[6] *Standards are recommended as benchmarks for comparative purposes.*

[7] *FMEP rate identified for spring chinook in upper Willamette River basin populations.*

[8] *Rate at maximum sustained yield for Sandy River population based on worst case productivity assumptions.*

Sandy River bright (LRW) Fall Chinook: Recent harvest rates for Sandy River LRW chinook (ocean and freshwater combined) averaged 38% and ranged from 25% to 51% (NMFS 2000b). Because of recent regulation changes permitting only finclipped chinook salmon to be retained, harvest related impacts to LRW in the Sandy will be substantially reduced. However, a stock recruitment relation has not been determined for this population making it difficult to estimate an appropriate exploitation rate. As a result, Sandy River bright fall chinook are managed according to escapement levels of the Lewis River fall chinook population. An escapement goal of 5,700 was established for Lewis River fall chinook based on spawner recruit analysis (McIsaac 1990). This escapement level has been met every year since 1980, except in 1999. Severe flooding in 1995 and 1996 led to limited egg and fry survival for those brood years. More conservative fishing rates are adopted in years of poor escapement. A harvest strategy based on the above should be a conservative approach that will allow recovery of the population, even under worse than average ocean conditions.

Western Cascade Tule Fall Chinook: Total freshwater and ocean exploitation rates should remain under the RER established for LCR fall chinook stocks. This assessment assumes that in-basin harvest rate projections for the Cascade Range tule fall chinook management unit are similar to or less than historical averages and ocean fisheries will be prosecuted under terms similar to existing biological opinions (e.g. NMFS 1999; NMFS 2000b) for those fisheries. A harvest strategy based on those assumptions should be a conservative approach that will allow these populations to fully utilize the available habitat. This management strategy will allow an adequate buffer for potential data error and management uncertainty.

NMFS 2000b estimated that LCR tule stock ocean and freshwater exploitation rates for broods 1985-1994 averaged 55% (Table 5). For broods 1991-1994 ocean and freshwater exploitation averaged 31%. The 1991-1994 broods were fully vulnerable to fisheries that were managed in response to listing of Snake River chinook stocks, and represent reasonable expectations of future fisheries impacts. Under the 1999 revised annexes to the Pacific Salmon Treaty we anticipate that future exploitation rates in ocean fisheries will be even less than would be expected under management strategies absent the revised annexes, as was the case for 1991-1994 broods (NMFS 1999).

Coast Range Tule Fall Chinook: Harvest strategies for tributary fisheries within this management unit allow for escapement necessary to meet interim viability thresholds. NMFS 2000b estimated that LCR tule stock ocean and freshwater exploitation rates for broods 1985-1994 averaged 55% (Table 5). For broods 1991-1994 ocean and freshwater exploitation averaged 31%. The 1991-1994 broods were fully vulnerable to fisheries that were managed in response to listing of Snake River chinook stocks, and represent reasonable expectations of future fisheries impacts. Under the 1999 revised annexes to the Pacific Salmon Treaty we anticipate that future exploitation rates in ocean fisheries will be even less than would be expected under management strategies absent the revised annexes, as was the case for 1991-1994 broods (NMFS 1999). The in-basin harvest rate projections for the Coast Range tule fall chinook management unit are similar to historical averages (Table 8). Even with expanded impacts possible in Columbia River mainstem fisheries, total freshwater and ocean exploitation rates should remain within the RERs specified for the Coweeman fall chinook stock, assuming ocean fisheries are prosecuted under terms similar to existing biological opinions (e.g.

NMFS 1999; NMFS 2000b) for those fisheries. This management strategy will allow an adequate buffer for potential data error and management uncertainty.

Spawning escapements have been consistently greater than the critical threshold of 600 since 1981 and averaged more than 2,800. However, it appears that virtually all of that escapement can be accounted for as first generation hatchery strays. The populations that make up the management unit are clearly dominated by hatchery origin fish and any change in that composition will require significant changes in the hatchery programs. Changes in harvest strategies will only serve to change the number of fish escaping, not the composition. The harvest strategies proposed in this FMEP will preserve the genetic characteristics of the current naturally spawning population and allow for escapement adequate to seed the available habitat at recent levels.

Columbia River Gorge Tule Fall Chinook: Harvest rates on BPH tules in mainstem Columbia River fisheries are managed to allow annual hatchery escapement goals to be achieved, which include a proportion of fish that stray into Bonneville Pool tributaries and spawn naturally. This management strategy ensures that recent natural spawning levels are maintained within Bonneville Pool tributaries. Harvest strategies for tributary fisheries within this management unit allow for escapement necessary to meet interim viability thresholds. Fisheries in most tributaries are closed to retention of chinook when adults are present. Only the Hood River was large enough to historically support an independent population of fall chinook. Harvest strategies for the Hood River allow retention of fall chinook in the 4.5 miles downstream from Powerdale Dam, however, fish abundance is too low and river conditions and flesh quality too poor to attract significant effort. Fishery impacts (albeit minor) occurs over the breadth of the adult return, which reduces the likelihood that harvest will exert selective pressures on any component of the run.

NMFS 2000b estimated that LCR tule stock ocean and freshwater exploitation rates for broods 1985-1994 averaged 55% (Table 5). For broods 1991-1994 ocean and freshwater exploitation averaged 31%. Additional exploitation on Bonneville Pool tule stocks occurs in treaty Indian fisheries in the mainstem Columbia River. We estimate that total ocean and freshwater exploitation of the 1991-1994 broods averaged 58%. The 1991-1994 broods were fully vulnerable to fisheries that were managed in response to listing of Snake River chinook stocks, and represent reasonable expectations of future fisheries impacts. Under the new Pacific Salmon Treaty we anticipate that future exploitation rates in ocean fisheries will be even less than would be expected under management strategies absent a treaty, as was the case for 1991-1994 broods (NMFS 1999). The in-basin harvest rate projections for the Columbia River Gorge tule fall chinook management unit are similar to historical averages (Table 8). Even with expanded impacts possible in Columbia River mainstem fisheries, total freshwater and ocean exploitation rates should remain within the 65% interim viability threshold, assuming ocean fisheries are prosecuted under terms similar to existing biological opinions (e.g. NMFS 1999; NMFS 2000b) for those fisheries.

The harvest strategies proposed in this FMEP will preserve the genetic characteristics of the current naturally spawning population and allow for escapement adequate to seed the available habitat at recent levels. This conservative management strategy will allow an adequate buffer for potential data error and management uncertainty.

2.1.1) Description of which fisheries affect each population (or management unit).

The Sandy River spring chinook population is affected primarily by the in-basin sport fishery targeting on hatchery spring chinook (Table 11). Incidental impacts also occur in steelhead fisheries that occur in the Sandy Basin. The mainstem Columbia sport and commercial spring chinook fisheries also have minor impacts. Fishery impacts to Sandy River spring chinook will be considerably reduced in 2002 with implementation of selective fisheries for hatchery spring chinook (Table 8).

The Western Cascades LRW and tule fall chinook population complexes are affected primarily by incidental impacts associated with the in-basin sport fishery targeting on hatchery coho in the Sandy and Clackamas rivers (Table 12). There are also impacts associated with a minor target chinook fishery in the Sandy Basin, as well as incidental impacts associated with steelhead fisheries in both basins. Sport and commercial fisheries in the mainstem Columbia River also have impacts that can at times be significant, especially for tule stocks. Fishery impacts to fall chinook in the Willamette, Clackamas, and Sandy rivers will be considerably reduced in 2002 when retention of nonadipose fin-clipped fall chinook is prohibited in these tributaries (Table 8).

The Coast Range tule fall chinook population complex is primarily affected by Columbia River sport and non-Indian commercial fisheries that occur in the mainstem Columbia and Select Areas (Table 12). Minor incidental impacts occur in tributary coho and winter steelhead fisheries. Some minor target chinook fisheries also occur in some tributaries, but most are closed to chinook retention.

The Columbia River Gorge tule chinook population complex is primarily affected by Columbia River sport and both treaty Indian and non-Indian commercial fisheries that occur in the mainstem (Table 12). Very minor incidental impacts occur in tributary steelhead fisheries.

All LCR chinook populations are also potentially affected by fisheries for resident trout, warmwater species, shad, smelt, and sturgeon that occur in tributary and mainstem Columbia River areas, however incidental impacts in these fisheries are insignificant.

Table 12. Fisheries addressed in the FMEP potentially affecting each population of wild Lower Columbia River chinook.

Fishery	Area	Sandy spring	Sandy fall bright	W. Cascade fall tule	Coast Range fall tule	Col. R. Gorge fall tule
Spring chinook	Sandy R. sport	X				
Fall chinook	Sandy R. sport		X	X		
	Small tributary sport				X	X
Winter steelhead	Sandy R. sport	X	X			
Summer steelhead	Lower Willamette R. sport			X		
	Sandy R. sport	X	X	X		
	Clackamas R. sport			X		
	Hood R. sport					X
	Small tributary sport					X
Smelt	Sandy R. commercial	X				
	Sandy R. sport	X				
Trout	Sandy R. sport	X	X	X		
	Small tributary sport				X	X
Warmwater spp	Lower Willamette R. sport			X		

2.1.2) Assessment of how the harvest regime will not likely result in changes to the biological characteristics of the affected ESU's.

Low harvest rates will result from implementation of selective fisheries for hatchery spring chinook and restricted retention of fall chinook in the Sandy Basin. This management regime will substantially reduce the potential for fishing-related changes in biological characteristics of wild Sandy River spring and fall chinook. In addition, low fishing rates for wild fish will result in increased numbers of wild spawners even in periods of poor freshwater migration and ocean survival conditions. Larger populations will be less subject to genetic risks and loss of diversity associated with small population sizes. Finally, increased harvest rates of hatchery spring chinook in selective fisheries should benefit wild stock integrity and diversity by removing a greater fraction of the hatchery fish which could potentially stray into wild production areas.

Fishing impact rates for all management units are spread over the breadth of the run so that no subcomponent of the wild stocks will be selectively harvested at a rate substantially larger than any other portion of the run. No significant harvest differential will occur for different size, age, or timed portion of the run.

2.1.3) Comparison of harvest impacts in previous years and the harvest impacts anticipated to occur under the harvest regime in this FMEP.

Current spring chinook impact rates in aggregate freshwater fisheries are substantially reduced from historic levels and will be reduced even further by future fisheries. With the advent of full selective fisheries in 2002, expected wild spring chinook impacts in all freshwater sport fisheries are expected to average 4.5% (Table 8). Total freshwater impacts are expected to average 8.6% including limited commercial fishery expectations of 4% consistent with continued Snake and upper Columbia river spring chinook constraints. This impact level is less than one-quarter the 1984-1999 average (Table 8).

Tributary harvest rates declined for most fall chinook management units between the 10-year period average for 1984-1993 and the most recent 5-year average for 1994-1998 (Table 8). The only increase was in the Coast Range fall chinook management unit, where additional fisheries targeting on hatchery SAB stock chinook have been implemented. Projected average harvest rates for all fall chinook management units are less than or equal to the recent 5-year average.

2.1.4) Description of additional fishery impacts not addressed within this FMEP for the listed ESUs specified in section 1.3. Account for harvest impacts in previous year and the impacts expected in the future.

The ocean distribution of Sandy River spring chinook is thought to be similar to UWR spring chinook, which are subject to some ocean fisheries. The majority of the ocean UWR catch occurs off the coasts of British Columbia and southeast Alaska (NMFS 2000b). LCR spring chinook from Cowlitz Hatchery are also caught in U. S. fisheries off Washington and Oregon (PFMC fisheries) (NMFS 2000b). The ocean fishery impact rate on UWR spring chinook averaged 22% for 1975-1983 brood years, 14% for 1984-1989 brood years, and 9% for 1990-1993 brood years (NMFS 2000b). These impact rates include all sources of fishery mortality from retention, hook and release, and drop off. Future rates in the

abundance-based management strategy included in the recently revised annexes to the Pacific Salmon Treaty are expected to increase from the recent average but will be less than the higher rates of the 1970's and 1980's (NMFS 1999).

Lower Columbia River fall chinook are also subject to significant ocean fishery impacts. The majority of fishery impacts to tule stocks occur in Canadian and PFMC fisheries (NMFS 2000b). Total ocean exploitation rates for LCR tule stocks averaged 68% for 1976-1990 broods and 31% for 1991-1994 broods (Table 5). Lower River wild fall chinook are also intercepted in ocean fisheries, although at a lesser rate than tule stocks. Total ocean exploitation rates for North Lewis River LRW chinook averaged 23% for 1981-1990 broods and 16% for 1991-1994 broods (NMFS 2000b). Future ocean harvest rates are anticipated to be lower than historical rates for tule stocks as a result of the revised annexes to the Pacific Salmon Treaty, but similar for LRW chinook (NMFS 1999).

Mainstem Columbia River fisheries (Table 13) are managed through the *U.S. v. Oregon* forum and have significant impacts on LCR chinook exploitation rates. Recent management strategies for fall mainstem fisheries are focused on achieving numerical escapement goals, and therefore harvest rates are variable and can be high in years of high abundance. Recent exploitation rates for Columbia River fisheries averaged 15% and 5% on LRW chinook for return years 1984-1993 and 1994-1999, respectively, based on abundance at the Columbia River mouth. Exploitation rates averaged 34% and 9% on LRH tule chinook, and 53% and 49% on BPH tule chinook for the same periods (Table 8). Projected impacts in future years are similar to historical levels.

Table 13. List of fisheries authorized through US v. Oregon consultations that potentially affect populations of wild Lower Columbia River chinook. Impacts from these fisheries were taken into account in the cumulative effects analysis in the FMEP.

Fishery	Area	Sandy spring	Sandy fall bright	W. Cascade fall tule	Coast Range fall tule	Col. R. Gorge fall tule
Spring chinook	Lower Columbia R. sport	X				
	Lower Columbia R. commercial	X				
	Columbia R. select area sport	X				
	Columbia R. select area commercial	X				
Fall chinook	Lower Columbia R. sport		X	X	X	X
	Lower Columbia R. commercial		X	X	X	X
	Columbia R. select area sport				X	
	Columbia R. select area commercial				X	
Winter steelhead	Lower Columbia R. sport	X				
Summer steelhead	Lower Columbia R. sport	X	X	X	X	X
Shad	Lower Columbia R. sport	X				
Smelt	Lower Columbia R. commercial	X				
	Lower Columbia R. Sport	X				
Sturgeon	Lower Columbia R. sport	X	X	X	X	X
	Lower Columbia R. commercial	X	X	X	X	X
Trout	Lower Columbia R. sport	X	X	X	X	X
Warmwater spp	Lower Columbia R. sport	X	X	X	X	X

SECTION 3. MONITORING AND EVALUATION

3.1) Description of the specific monitoring of the "Performance Indicators" listed in section 1.1.3.

Performance indicators for Sandy River spring chinook include fish population indicators and fishery indicators. Independent estimates or indices of population numbers are available annually. Fishery indicators are not available until about two years post season, when catch record card analyses are complete. Primary fish population indicators for wild Sandy River spring chinook are spawning escapement estimates from Marmot Dam counts. Secondary fish population indicators are index spawning area redd counts and carcass sampling in the upper Sandy Basin, and CRC estimates.

Marmot Dam and fish passage facilities on the Sandy River are operated by Portland General Electric. Upstream fish counts are taken at the Marmot fish ladder using a digitized picture system which creates a computer image as fish pass through a light curtain. Pictures are then retrieved for species composition data. Prior to June 1996, counts were made using a mechanical counter equipped with a camera for species composition data. The ODFW operates a trap in the Marmot fish ladder so that salmon

and steelhead ascending the fish ladder can be sorted, and adipose fin-clipped fish can be removed. Nonfinclipped fish are passed into natural production areas upstream from the dam. Institution of 100% marking of hatchery spring chinook will allow all hatchery chinook to be removed when these adipose fin-clipped fish are fully recruited in 2002.

The ODFW also counts redds and samples carcasses in the upper Sandy Basin tributaries to estimate spawner numbers and hatchery:wild fractions, when budget limitations allow. A total of 18.3 miles of spawning index habitat is surveyed twice annually in October. Carcasses are sampled to estimate stock and age composition so that recruitment rates and wild stock productivity can be estimated. Carcass recoveries rather than Marmot trap samples are used to minimize handling at the trap.

Spawning ground surveys for fall chinook are conducted by ODFW on most LCR tributaries in the LCR chinook ESU. Generally, streams with tule fall chinook are surveyed once in late September or October. In addition, surveys are conducted on some streams from mid-October to mid-November to look for LRW stocks. Multiple surveys are conducted on the mainstem Sandy River from late October to late November to evaluate both tule and LRW spawning populations.

Surveys record counts of live fish, carcasses, and redds. Peak counts of redds are expanded to estimate total spawning abundance. All recoverable carcasses are mark sampled for finclips. Snouts are removed from adipose fin-clipped fish and analyzed for CWT recovery and decoding. CWT recovery data are transferred to the ODFW information system for inclusion in the Pacific States Marine Fisheries Commission CWT mark recovery database. All fish examined for marks are mutilated to prevent resampling in subsequent surveys. Biological data including fork length, sex, and scales, are also collected from a random sample of carcasses. These data are used to determine length frequency, and sex and age composition of the returning adults.

Historic data on chinook salmon fisheries in lower Columbia River tributaries is available from catch record cards. The analysis of CRC returns involves fisheries state-wide, and requires about two years for a preliminary catch estimate and another year to finalize the estimate. Commercial fishery landings are estimated inseason by contacting wholesale buyers regarding their purchases. The number of active buyers is small and all are contacted for daily accounting of the catch. Landings are verified post-season from fish landing tickets. All fish buyers are required to complete and return fish receiving tickets for all purchases as a condition of their license. The commercial catch is subsampled inseason at fish buying sites to gather biological data including CWTs. Mainstem and Select Area commercial fisheries for salmon and sturgeon are sampled at a minimum 20% rate.

Fishery catch data, when combined with Marmot Dam counts and/or estimates of spawner abundance provides estimates of the aggregate run sizes to the tributary and the mouth of the Columbia River. These run size estimates and estimated harvest are the basis of fishery harvest rate estimates.

3.2) Description of other monitoring and evaluation not included in the Performance Indicators (section 3.1) which provides additional information useful for fisheries management.

In addition to routine monitoring and evaluation activities described in above, the ODFW also collects or uses information from a variety of sources related to the status of listed LCR chinook and the implementation of fisheries which might affect them. Since 1996, the ODFW has conducted a research study aimed at key population indices for Sandy Basin spring chinook. This study has made detailed investigations of the distribution and abundance of natural spawners (Grimes et al. 1996; Lindsay et al. 1997, 1998; Schroeder et al. 1999).

Additional information on fishery impacts in combined ocean and freshwater selective fisheries will also be available based on double index tagging studies of hatchery spring chinook. Double index tagging compares the return rate of marked groups of fish from which the adipose fin has and has not been removed. The difference results from selective fishery impacts in ocean and freshwater fisheries that are restricted to adipose-fin-clipped fish retention only. Analyses of coded-wire tag recoveries will also provide information on fishery contributions and exploitation rates for Sandy River spring chinook.

Finally, extensive monitoring and evaluation is conducted for LCR hatchery programs. This includes inventories of production and returns, tracking straying, monitoring fish health, and relating return rates to hatchery practices.

3.3) Public Outreach

The ODFW conducts extensive public involvement and outreach activities related to chinook salmon fishery management and recovery. The annual fishery regulation process involving a series of public meetings, information mailouts, press releases, and public hearings was described in detail in section 1.5. Anglers are keenly aware of and accustomed to abrupt inseason management changes including closures and reopenings with short notice. Permanent regulations are detailed in published pamphlets of fishing regulations. Annual regulation and inseason changes are widely publicized with press releases, phone calls, or faxes of action notices to key constituents, and signs posted at fishery access points. The ODFW also operates an information line, a tape-recorded hotline, and an Internet web page where timely information is available.

3.4) Enforcement

Sport fishing regulations in Oregon are enforced by the Fish and Wildlife Division of the Oregon State Police working in close partnership with the Oregon Department of Fish and Wildlife. The OSP and ODFW work together to develop enforceable regulations to achieve fish and wildlife resource management goals. The Fish and Wildlife Enforcement Division of the OSP currently includes 128 Supervisors and Troopers including 105 assigned to general fish, wildlife, and natural resources law enforcement, and 13 Troopers assigned specifically to protection of anadromous fish and their habitat under the "Oregon Plan for Salmon and Watersheds." Another 6 Troopers are assigned to commercial fish enforcement. Permanent staff are also supplemented with cadets. Enforcement activities in the LCR ESU are conducted from offices in Astoria, Scappoose, Portland, and The Dalles.

ODFW and OSP work together to facilitate enforcement of resource management goals through an annual cooperative enforcement planning process where local Troopers meet yearly with local biologists to set enforcement priorities by species. Troopers then develop tactical plans to address priority issues and gain desired compliance levels to

protect resources and meet management goals. The results of each tactical plan are quantified and compared to the compliance level considered necessary to meet management goals. Compliance is typically estimated based on the percentage of angler contacts where no violations are noted. Tactical plans are adjusted if necessary based on compliance assessments to make the best use of limited resources in manpower and equipment to achieve the goals.

3.5) Schedule and process for reviewing and modifying fisheries management.

3.5.1) Description of the process and schedule that will be used on a regular basis (e.g. annually) to evaluate the fisheries, and revise management assumptions and targets if necessary.

To ensure that fish population and fishery management is meeting the goals described in this plan, annual monitoring will include wild fish escapement numbers and/or indices, projected future wild and hatchery numbers based on age composition of recent returns, fishery harvest, mark rates in the escapement areas, and projected fishery impacts on wild fish. This information and preseason cumulative fishery harvest rates for the next fishing season will be provided to NMFS' Hatcheries and Inland Fisheries Branch in Portland, Oregon, by March 31st of each year the FMEP is in effect. This information will be used to ensure tributary fishery impacts do not exceed RER harvest limits specified in section 7 consultations.

One key question is whether wild populations are above or below critical abundance and productivity thresholds. In years where thresholds are not expected to be achieved, additional fishery limitations will be considered to reduce fishery impacts on wild populations. Additional restrictions in mainstem Columbia River fisheries will also be considered based on the specifics of the problem, the effects of tributary closures, and the benefits of additional closures. Fishery restrictions may involve a combination of time and area closures, reduced bag limits, and quotas as necessary. Sport fishery restrictions would be regulated as part of the annual review process for permanent regulations, or through emergency action by the ODFW and the OFWC. Mainstem commercial fishery restrictions would occur in the Columbia River Compact forum as part of the normal inseason management process.

Before ODFW proposes any changes to the existing angling regulations that may affect listed juvenile or adult chinook salmon in the management area of the FMEP, ODFW will provide to NMFS information and analyses on how the regulation change will impact listed salmon. This information will be provided at least two weeks before a decision will be made by the Oregon Fish and Wildlife Commission.

3.5.2) Description of the process and schedule that will occur to evaluate whether the FMEP is accomplishing the stated objectives. The conditions under which revisions to the FMEP will be made and how the revisions will likely be accomplished should be included.

This FMEP is intended to remain in effect indefinitely. Wild population status and fishery performance will continue to be assessed by the Oregon Department of Fish and Wildlife on an annual basis. The Oregon Department of Fish and

Wildlife will conduct a comprehensive review of this plan after the 2005 fisheries to evaluate whether fisheries and wild populations are performing as expected. Comprehensive reviews will be repeated by the Oregon Department of Fish and Wildlife at 5-year intervals thereafter until such time as the wild stocks are recovered and delisted. Consultations between the Oregon Department of Fish and Wildlife and the National Marine Fisheries Service regarding management of fisheries impacting listed LCR chinook will be reinitiated only if significant changes in the status or designation of LCR chinook, projected benefits of selective sport fishery implementation, habitat conditions, management processes, or other unforeseen developments necessitate revision.

One likely change will be the outcome of the proposed decommissioning of Marmot and Little Sandy dams. Decisions regarding removal options, fish passage facilities, mitigation programs, hatchery practices, and fish management plans may have significant ramifications to the management regime proposed in this FMEP for Sandy River chinook populations, particularly spring chinook. It is anticipated that ODFW and NMFS will remain actively involved with the process that drives the decisions on removal options and fish passage issues, and will consult on subsequent fish management issues as they arise.

SECTION 4. CONSISTENCY OF FMEP WITH PLANS AND CONDITIONS SET WITHIN ANY FEDERAL COURT PROCEEDINGS

Actions and objectives contained in this proposed FMEP related to LCR chinook do not directly impact Federal tribal trust resources. There are no existing court orders with continuing jurisdiction over tribal harvest allocations that are relevant to the implementation of the proposed FMEP with respect to LCR chinook.

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